2 Techniques of Listening

A Brandes advertisement from the May 1925 issue of *Wireless Age* bears an imperative title: "You *need* a headset" (figure 9). As radio loudspeakers were becoming a popular alternative to headphones, Brandes may have felt that it needed to convince readers of *Wireless Age* that they needed headsets; or this may just have been a standard advertising line.[1] Either way, the ad actually bothers to tell readers *why* they need a headset: "You *need* a headset: to tune in with; to get distant stations—both domestic and foreign; to listen-in without disturbing others; to shut out the noise in the room—and get all the radio fun; to get the truest and clearest reception—always."[2] In telling us why we need a headset, Brandes offers a promising entry point into a much longer history of listening.

Headsets were not actually necessary for tuning a radio. Instead, they helped their users to better "DX" or listen for distance—to hear very faint, indistinct, and distant sounds, stretching the existing capacity of their radios and their ears. Picking up faint, faraway stations was one of the holy grails of amateur radio listening (see figure 10). Brandes's ad is clearly aimed at DXing.[3] As the ad also intimates, headphones isolate their users in a private world of sounds. They help create a private acoustic space by shutting out room noise and by keeping the radio sound out of the room. They also help separate the listener from other people in the room. Through this isolation, the headphones can intensify and localize listeners' auditory fields, making it much easier to pay attention to minute sonic details and faint sounds. Brandes's headphones provide the "truest and clearest reception" because of this emphasis on sonic detail through isolation.

can go somewhere to learn about cultural practices through participation and observation; historians and genealogists must reconstruct domains of physical practice from documents and artifacts. But the issue of technique remains salient.

Techniques of the body are constructed through "physical education of all ages and both sexes," and, as we will see, techniques of listening are also the result of physical education, whether this education is institutionalized in professional training or simply accomplished through shared and repeated practice.[11] The term *technique* also conjures up names like Aristotle, Martin Heidegger, and Jacques Ellul. It connotes a connection among practice, technology, and instrumental reason: it is a form of "reasoned production," "a way of revealing," a "means with a set of rules for the game." Under the sign of modernity, technique carries a special value and a special valence—it is connected with rationality. Technique brings mechanics to bear on spontaneity.[12]

This is an incredibly important point for a history of communication technology: after Mauss, the body is the first communication technology, and all the *technologies* of listening that I discuss emerge out of *techniques* of listening. Many authors have conceptualized media and communication technologies as prosthetic senses. If media do, indeed, extend our senses, they do so as crystallized versions and elaborations of people's prior practices—or techniques—of using their senses. So, although *technique* and *technology* are terms that clearly bleed into one another, the distinction is crucial for the history of sound. *Technique* connotes practice, virtuosity, and the possibility of failure and accident, as in a musician's technique with a musical instrument. It is a learned skill, a set of repeatable activities within a limited number of framed contexts.

Listening involves will, both conscious and unconscious—perhaps a better word than *will* would be *disposition* or even *feel*. Orientations toward and styles of listening are part of what sociologists and anthropologists have come to call *the habitus*. Following Pierre Bourdieu, *habitus* denotes a set of dispositions, what he calls *a feel for the game*. The habitus is socially conditioned subjectivity: it combines all those forms of informal knowledge that make up social life. Habitus is a mix of custom, bodily technique, social outlook, style, and orientation. Because habitus is socially conditioned, social position and subjective disposition go together—each influences the development of the other.[13] Industry, bureaucracy, science, rationalism, and the new middle class are all so central to the genealogy of audile technique precisely because techniques of listening represent dispositions articulated within a range of social possibilities.

Modern audile technique combines a relatively stable set of practical orientations toward sound and listening. Although there may be other distinctively modern techniques of listening, the following list represents the orientations common to medicine, telegraphy, and the sound-reproduction technologies considered in this chapter and the next:

1. Listening gets articulated to notions of science, reason, and rationality. Listening becomes a technical skill, a skill that can be developed and used toward instrumental ends. This is hard to describe, and harder to stress, since there are few English words to connote the sonic equivalents of *gazing* or *observing*. We are used to the idea that new orientations toward looking, often thematized as "the gaze," have something to do with changing ways of knowing during and after the Enlightenment. As it was for looking, so it was for listening: audition becomes a site through which modern power relations can be elaborated, managed, and acted out. Starting in a few select contexts, the very meaning of listening drifts toward technical and rational conceptions. Over the long nineteenth century, listening becomes a site of skill and potential virtuosity.
2. In order for listening to become useful as a tool of rationality (and for itself to be rationalized), it had to be constructed as a discrete activity. Chapter 1 introduced the "separation of the senses" and the isolation of hearing in Bell, Müller, and Helmholtz. In the actual practice of audile technique, listening was similarly separated from other sensory activities. As we will see, audile technique is oriented toward a faculty of hearing that is separated from the other senses. Once so separated, it can be intensified, focused, and reconstructed.
3. Concurrent with the separation of hearing from the other senses is a reconstruction of the shape of acoustic space. Audile technique was not simply a representation of acoustic space; it aimed actively to transform acoustic space. The space occupied by sounds becomes something to be formed, molded, oriented, and made useful for the purposes of listening techniques. It can be segmented, made cellular, cut into little pieces, and reassembled. Acoustic space becomes a kind of bourgeois private space. As I will show, even collective conceptions of listening assume that collectivity is entered through this prior, private auditory space.

problematizes the content of acoustic space. The previous chapter showed how sound gets constructed as an object in physics, acoustics, and physiology. Whereas voices or music had been privileged instances of sound, now they were merely instances of a more general category of sound. In audile technique, sounds also became meaningful precisely for their sonic characteristics, in a manner parallel to the way in which timbre became a central concern of nineteenth-century acoustics after Helmholtz. On the basis of their sonic character, sounds become signs—they come to mean certain things. Technical notions of listening depend on the establishment of a code for what is heard but exist without an effective metalanguage. A metalanguage of sound would consist of a nonspecialized set of terms that enabled people to describe the details of audile experience in a purely abstract manner. While visual experience has a well-developed metalanguage, sonic experience does not. We have abstract words to describe color, texture, shape, direction, shading, and so forth. Conversely, most of the language used to describe elements of auditory phenomena is metaphoric: aside from specialized languages in musicology, sound engineering, acoustics, and general descriptors such as *loud* or *quiet,* there are very few abstract words in common English for describing the timbre, rhythm, texture, density, amplitude, or spatiality of sounds.[14] Because of the difficulties involved in constructing a metalanguage of sound, audile technique would come to stress listening practice and practical knowledge through listening, rather than formal and abstract descriptions of sounds.

5. Techniques of listening are based in and described through a language of mediation. Audile technique is premised on some form of physical distance and some mediating practice or technology whereby proximal sounds become indices of events otherwise absent to the other senses. This was in part a component of rationalizing listening and turning it into a skill. It was also in part a component of isolating and intensifying hearing as a faculty.
6. Finally, audile technique could come to hold a great deal of symbolic currency: virtuosity at audile technique could be a mark of distinction in modern life. Both doctors and sound telegraphers used representations of listening as part of their professional mystique. The more generalized audile technique associated with sound-reproduction technologies was widely understood as an index of those technologies' modernity.

Speaking generally, audile technique articulated listening and the ear to logic, analytic thought, industry, professionalism, capitalism, individualism, and mastery—even as it required a good deal of guesswork in practice. The history of audile technique thus offers a counternarrative to Romantic or naturalistic accounts that posit sight as the sense of intellect and hearing as the sense of affect, vision as the precise, localizing sense and hearing as the enveloping sense.[15] Some medical historians have suggested that there is a uniquely modern medical gaze. If this is the case, then modern orientations toward medical listening were a necessary precondition for this gaze as we know it. If, as many media historians have suggested, electric telegraphy heralds the age of modern mass communication, then listening is at the very core of modern media history. If technologies of sound reproduction depended on and actuated versions of audile technique, they drew together a diverse field of practices that had been developing for decades. To capitalize and commodify sound, sound media industries deployed a preexisting notion of sonic space as private property.

Audile technique emerged as a distinctively modern set of practical orientations toward listening. As a way of knowing and interacting with the world, it amounted to the reconstruction of listening in science, medicine, bureaucracy, and industry. It helped constitute these fields. Audile technique was also a distinctly bourgeois form of listening; it corresponded with the emergence of *middle class* as a salient cultural category. Thus, the orientations toward listening that accompanied sound-reproduction technology in the late nineteenth and early twentieth centuries are part of a longer-term historical current. Many writers in the 1920s and 1930s pinned radio's cultural significance on its use of hearing—"a novel sense." Rudolph Arnheim understood radio perception as a kind of blindness, an aesthetics of the audible with the visual component subtracted. For Hadley Cantril and other radio researchers, radio represented a unique psychological phenomenon, where *listening* became synecdochic for all activities of audiencing.[16] These primarily developmental accounts posit the existence of a history of listening and at the same time close it down—radio, film, and sound recording become the agents of acoustic modernity. They treat sound-reproduction technologies as positing a new way of hearing. In contrast, this genealogy of audile technique begins an argument for listening that will be continued throughout the book: over the course of the

Johnson means that, as listening turned away from the formal melodic and harmonic structure of the music, it turned to the sonic characteristics of the music. Listening for acoustics and fidelity—listening as technique—constructed music as just one more instance of sound. Technique appears as a tangent to Johnson's cultural history precisely because he is interested in the specific practice of concertgoing. But right alongside Johnson's cultural history runs a parallel tale of audile technique—perhaps not the definitive moment of the "modernization of the ear," but certainly a movement that connects Johnson's deceased past with a living present. His conclusion suggests the necessity for the genealogy that I perform here: Where did audile technique come from? How and why did it emerge at the end of the nineteenth century?

Like silent, contemplative concertgoing, audile technique also grew up with the modern bourgeoisie, but it came to music rather late. Audile technique was cultured and developed in relatively circumscribed professional domains of middle-class life. Medicine and telegraphy were two fields where techniques of listening provided professional ethos and prestige. Audile technique functioned as part of the practical and official knowledges of these fields. The use of the stethoscope marked medicine for over a century, and, through its use, hearing surpassed sight as a diagnostic tool. The specificities of listening were themselves able to be applied to the body of the patient; medical listening rendered the interior motions of the human body to medical thought in a new clarity. Sound telegraphy, on the other hand, was the first major electronic medium in the United States, and the development of sound telegraphy represents the instrumentalization of hearing in a bureaucratic-corporate context. Medicine was an upper-middle-class profession, telegraphy a lower-middle-class profession. Both the stethoscope and the telegraphic "sounder" were technologies that crystallized already-extant techniques of listening. As I will discuss in the next chapter, the iconography of listening to early sound-reproduction technologies, especially around ear tubes and headphones, suggests a direct line of descent from the stethoscope and the telegraph to the telephone, phonograph, and radio. Sound-reproduction technologies disseminated and expanded these new technical notions of listening through their own institutionalization.

From roughly 1810 on, audile technique existed in niches at either end of the growing middle class. It would not become a more general feature of middle-class life until the end of the nineteenth century, when sound re-

ploded in size and changed in outlook and orientation. In the meantir audile technique was a well-known but emergent, specialized practice tha helped reconstruct the meaning of listening in modern life.

Mediate Auscultation and Medicine's Acoustic Culture

One of the most enduring symbols of modern medicine has been a listening technology: the stethoscope. The stethoscope marks an important point in the history of listening and connects it to the history of medicine's industrialization and professionalization: it marks the articulation of the faculty of hearing to reason, through a combination of spatialization, technology, pedagogy, and ideology. Michel Foucault calls clinical medical experience "that opening up of the concrete individual, for the first time in Western history, to the language of rationality, that major event in the relationship of man to himself and of language to things."[20] If medicine was one of the first sites where the conceptual tools of rationality and empiricism were combined with techniques of investigation to make the human body an object of knowledge, then it turns out that a technique of listening was instrumental to reconstructing the living body as an object of knowledge. Listening was one of the central modalities through which modern medical ways of knowing were developed and enacted. Before the insides of living human bodies could be subjected to the modern gaze, they were subjected to physicians' techniques of listening.

Michel Foucault, Stanley Joel Reiser, and Jacalyn Duffin offer probably the most developed accounts of the use of the stethoscope as a technique of audition, and my analysis here builds on their work. These authors all argue that modern medicine embodies in its development a movement from the theoretical to the perceptual: the rise of empiricism is key here, but more important than the approach is the construction of a new object. These authors chart a new field of knowledge, an arrangement of what can be seen and what can be said.[21] Listening would play a tremendous role in this new medical epistemology.

The history of the stethoscope is not so much about the actual artifact as the technique that it crystallized. As I will use it in this chapter, *mediate auscultation* refers to the practice of listening to movements inside the body with the aid of an instrument (hence *mediate*). Mediate auscultation is the technique of using a stethoscope to diagnose. *Auscultation* is a noun

I rolled a quire of paper into a kind of cylinder and applied one end of it to the region of the heart and the other to my ear, and was not a little surprised and pleased, to find that I could thereby perceive the action of the heart in a manner much more clear and distinct than I had ever been able to do by the immediate application of the ear. From this moment I imagined that the circumstance might furnish means for enabling us to ascertain the character, not only of the action of the heart, but of every species of sound produced by the motion of all the thoracic viscera. . . . With this conviction, I forthwith commenced at the Hospital Necker a series of observations, which have been continued to the present time.[27]

The "from this moment I imagined" is key. In his own telling, Laennec gives his scientific training and occupational ideology the weight of immediacy: at the moment of discovery, he abstracted a crude acoustic principle behind the act; from this basic insight, he posited a series of investigations. Every movement of the organs in the human thorax could be tracked by *listening* to the body with the aid of an instrument, and those movements could be rendered meaningful. *This* was Laennec's innovation, not the physical composition of a simple device to accomplish the task. Laennec claimed that he had thus invented the technique of mediate auscultation: listening to the body through a medium at a physical distance.

Although Laennec's own assessment provides us with useful clues to the importance of mediate auscultation for the history of listening, his story is probably a mixture of fiction and fact. "Post hoc" stories of scientific discovery "are never innocent; they are written with full knowledge of the ultimate significance of the event."[28] Laennec was aware of Hippocratic passages on auscultation and had known the basic physics behind mediate auscultation since his youth. Another French physician, François Double, had, in 1817, published a book that recommended direct auscultation of the patient—two years before the first edition of Laennec's *Treatise on Mediate Auscultation.* The British doctor William Hyde Wollaston used a long "stick" to transmit sounds from his foot to his ear, although Laennec claims not to have known about Wollaston's work (which was perhaps derived from Thomas Young's physics experiments published a few years prior).[29] More important, no record exists for the case that Laennec describes as his moment of discovery. Laennec's details are vague, and the medical historian Jacalyn Duffin could find no corresponding record in Laennec's papers. By Duffin's estimate, the case records point to early 1817 as the beginning of research into mediate auscultation and the use of stethoscopes; the earliest published reference to mediate auscultation refers to a case from March 1817, although Laennec may have attempted mediate auscultation as early as the fall of 1816 (which is the time frame for discovery claimed by Laennec and some of his students many years after the fact).[30]

That Laennec's narrative of invention is a bit distorted should surprise nobody. But the context of his invention and the content of his own narrative yield many clues as to what mediate auscultation was designed to do and what it accomplished. Laennec's approach to hearing was technical. Mediate auscultation was a highly structured activity that required practice to perfect. The new practice of listening through a stethoscope was also grounded in the emerging medical epistemology of pathological anatomy. As Duffin has shown, Laennec's work also developed out of and contributed to physiology.[31] Mediate auscultation would help reshape those fields. Its effects lay in three distinct areas:

1. It enacted and embodied a new spatial and social relation between doctor and patient.
2. It reconstructed sound as a field of possible data for medical perception and knowledge.
3. It would, Laennec hoped, elevate the practice to pure science by building a scientific metalanguage of sounds based on a synthesis of the doctor-patient relation and the newly demarcated domain of audible medical signs.

At the same time as they sought to develop a lexicon of acoustic-pathological signs, Laennec and his followers emphasized the importance of practice in listening to patients' bodies. I will develop an analysis of these issues through an extended reading of the third edition of Laennec's *A Treatise on the Diseases of the Chest and on Mediate Auscultation* and some of the other key texts of mediate auscultation in the nineteenth century. Laennec's *Treatise* is a crucial document because it explains in great detail why doctors should use stethoscopes to listen to their patients, how they should use their stethoscopes, and how to understand what they hear through the tube. The *Treatise* consists of a preliminary essay on methods of physical diagnosis and a series of longer essays on the actual diagnosis of different diseases of the thorax, the bronchia, the lungs, the membrane covering the lungs and chest cavity, the circulation, and the heart. Later writings on mediate auscultation would be considerably shorter, essentially taking for granted many of Laennec's arguments.

the inversion of the hearing aid as the generalization of its principle. Even as it posited the possibility that doctors could become virtuoso listeners, mediate auscultation endowed its practitioners with a functional disability. The unaided ear was not enough: for centuries, the hard-of-hearing had used ear trumpets as hearing aids. Now doctors—whose hearing was ostensibly healthy—could augment their auditory abilities. One early model of the monaural stethoscope, called a *conversion tube,* made the equivalence clear: the stethoscope could also be used as a hearing aid. Like the sound technologies that would appear later in the century, the stethoscope was built on a pedagogy of mediate auscultation that rendered the human ear an insufficient conductor of sound. In point of fact, the ear *was* insufficient for the purposes of internal medicine since the stethoscope was designed to render sounds otherwise imperceptible to the human ear more clearly audible. As it would come to be with the ear phonautograph, the telephone, and the phonograph, so it was with the stethoscope: mediate auscultation fetishized the cultural status and trappings of hearing loss. This is to say that, as far as Laennec was concerned, all of his doctors needed a hearing aid—no matter what condition their hearing was in. Even the doctor's trained ear could never hear enough without the stethoscope.

While empiricism is usually cited as the operative epistemology of early-modern medicine, an epistemology of mediation is equally central to the apprehension of sensory data: the interior of the chest would not yield up its truth to the unaided senses. Doctors had to have the right tools and training to discover interior bodily states through listening. Consider Laennec's objections to listening to the patient's body *without* a stethoscope. In a section in the *Treatise* on immediate auscultation—where physicians would apply their ears directly to the bodies of the sick[35]—Laennec lists six major faults with this technique:

1. Any increased quality of hearing experienced through immediate auscultation as opposed to mediate is a result of the physician's entire face conducting sound when in contact with the patient's body, thus leading to "serious mistakes in cases where pulmonary obstruction is partial and of small extent."
2. It is not physically possible to apply the ear to a number of important regions for diagnosis (such as the angle formed by the clavicle and the head of the humerus in lean persons, the lower region of the sternum when it is depressed, etc.). Moreover, it is not *socially* possible to apply the physician's ear to the body of respectable women: "In the case of females, exclusively of reasons of decorum, it is impracticable over the whole space occupied by the mammae."
3. The application of the naked ear requires applying more pressure to the patient's chest, thereby further fatiguing the patient.
4. This added pressure can lead to extraneous sounds generated by the patients tightening their muscles or the physician's head rubbing against the patient's clothes, which can be mistaken as respiration.
5. "The uneasy posture which one is frequently forced into, determines the blood to the head and renders the hearing dull. This circumstance, and the repugnance which every one must feel to apply the ear to a patient that is dirty or whose chest is bathed in perspiration, must always prevent the habitual or frequent use of this method." Since auscultation is most advantageous for the early detection of disease before it presents any visual signs, the physician's presumed reluctance to use it in every single case may prevent effective diagnosis.
6. Finally, the stethoscope adds to the naked ear and the sounds of the patient's body its own acoustic properties, which aid in the detection of certain physical properties in the patient.[36]

Here, in nascent form, we find the basic tenets of audile technique laid out decades before it would be articulated to technologies of sound reproduction. To offer an anachronistic paraphrase: "Physicians! Auscultators! You *need* a headset! To tune in the sound of the body, to hear interior states that you otherwise wouldn't, to eliminate the noise of the room and your own body, and to always get the truest and clearest reception of gasses and liquids inside the chest." A century before Brandes headphones, it is all there in the *Treatise:* the separation of hearing from the other senses, the production of noises otherwise inaudible to the naked ear, the demarcation of interior and exterior sounds, and the drive for true fidelity. But, because Laennec explains *why* physicians need headsets, his work helps us understand the philosophical and social roots of audile technique. There are two main issues at work in Laennec's objections to immediate auscultation: he is very much concerned with an epistemology of mediation (and mediation through the use of technology), but there is also an important relation between physical distance between doctor and patient and social distance. I will consider each issue in turn.

The *Treatise* is in part a guide for physicians to get the perceptible world into their senses. It aimed to teach doctors how to listen but also how to think about the act of listening to patients. Mediate auscultation is the

listening through the stethoscope as a kind of concentration, an isolation of the sense of hearing from the other senses. This isolation was an advantage of mediate auscultation over immediate auscultation; it was also an essential component of stethoscope pedagogy. The proper execution of mediate auscultation depended on the proper separation of hearing from other sensations and also the proper orientation toward the sounds heard through the stethoscope.

The development of the stethoscope and mediate auscultation coincided with the development of new theories of sense perception based on a "separation of the senses." As discussed in chapter 1, each sense "gets its due," so to speak, in Enlightenment science. From this point on, it becomes possible—at least in the pages of a medical textbook—to think of each of the senses as ideally and totally isolated from one another at a fundamental level. If the senses were, before the late eighteenth century, conceived as a kind of complex whole, they now became an accumulation of parts—a tool kit. So, at roughly the same time that the physiologists Charles Bell and Johannes Müller were positing the physiological separation of the senses, Laennec posited a practical separation of the senses. According to Laennec's objections to immediate auscultation, not only does the use of the stethoscope make up for some of the insufficiencies of the human ear, but it also isolates the faculty of hearing from the other senses and renders aberrant any conduction of audible vibration by body parts *other* than the ear. Hearing is to be separated from touch (and especially bone conduction)—anything else is an aberration. This is the substance of his first objection to immediate auscultation: bones outside the ear can conduct vibration and, therefore, sound. The physician's ear, like the physician's eye, thus becomes a separated sense, divided from the others, whose specificity was to be preserved and intensified through the proper use of instrumentation. The stethoscope rendered audible phenomena otherwise unavailable to doctors' senses, thereby increasing their powers of investigation. "The prohibition of physical contact makes it possible to fix the virtual image of [i.e., *to listen* to] what is occurring well below the visible area," writes Foucault.[40] *Mediate* auscultation displaces its "immediate" counterpart as the default status for medical listening in Laennec's account. A simple instrument marks and helps solidify a whole medical epistemology of mediation.

As hearing became an object of medical knowledge through physiology and otology, listening becomes a route to medical knowledge.[41] This new understanding of perception also has significance for the practice of perception: since each of the senses are, ideally, autonomous, one of the purposes of technique is to develop them toward that ideal state. It makes perfect sense for Laennec to suggest that the ear must not be supplemented, in the first instance, with touch through the hands or the combined senses of touch and hearing (via bone conduction) enabled by placing the face directly against a patient's body. In order to get the truest possible sense data (reception), for the doctor to *really* listen, hearing must be separated from the other senses. Once so separated, hearing can be supplemented by techniques and technologies especially designed for it. As the ear comes to be conceived as a technology, an apparatus to register a piece of the vibrating world inside doctors' heads, the ear becomes particularly amenable to other technologies. Laennec's stethoscope helped accomplish this, and later stethoscopes would improve on this principle of isolation and intensification.

In addition to separating hearing from the other senses, mediate auscultation demanded a particular kind of framing of sound. It put a frame around some of the sounds audible through the stethoscope, rendering some sounds as interior sound and others as exterior noise. Only sounds inside the frame were to be analyzed or considered for diagnosis. The sounds of the apparatus itself, and the other sounds accompanying auscultation, were to be ignored:

> The ability to abstract the mind from thoughts and other sounds than those to which the attention is to be directed, is essential to success in auscultation. All persons do not possess equally this ability, and herein is an explanation in part of the fact that all are not alike successful. To develop and cultivate by practice the power of concentration, is an object which the student should keep in view.
>
> Generally, at first, complete stillness in the room is indispensable for the study of auscultatory sound; with practice, however, in concentrating the attention, this becomes less and less essential.[42]

This combination of abstraction and framing was soon embodied in a modification of the stethoscope: the binaural stethoscope. Although ideas for binaural instruments go back to at least 1829, the first widely used binaural stethoscope was designed by Arthur Leared in 1851. It consisted of a small chest piece that connected with two gutta percha pipes for the physician's ears.[43] The binaural model quickly found favor for several reasons: by providing sound to both ears, it further helped isolate physicians from other sounds and concentrate the sound in their auditory fields. It also held itself on the physician's head, thereby freeing both hands for use on the patient. Many users also claimed that it provided a better quality of sound,

it is always inconvenient both to the physician and patient; in the case of females it is not only indelicate but often impracticable; and in that class of persons found in hospitals it is disgusting."[49] Long before the germ theory of disease would have suggested a need for distance between doctor and patient, Laennec was worried about the propriety of male doctors touching women's breasts ("mammae"), the disgust that he and others might feel at various illnesses and conditions of patients, and the class difference between doctors and their hospital patients. As a technique of and disposition toward listening, mediate auscultation located its practical philosophy of sensory mediation with a practice of social mediation. Laennec's objections to the use of the naked ear in medicine are instructive because they show the dual basis of an audile/medical procedure: in an emergent organization of sensation itself and in the organization of social differences.

Mediate auscultation is a response to the analogy of physical and social distance. Laennec does not mention in his justifications of mediate auscultation the danger of contracting disease. He presents the need for distance between doctor and patient as emphatically social. While, from today's ultrasanitized standpoint, Laennec's disgust at his smelly, sweaty, and sickly patients might seem perfectly reasonable, we should not be so quick to accept it simply as a transhistorical fact. To begin with, Laennec was smelly, sweaty, and sickly a good deal of the time himself. He is known as "one of the great invalids of tuberculosis history," sometimes so breathless that he "could not tolerate the weight of his clothing and would have to strip to the waist in order to keep working at his desk."[50] Even the Paris of Laennec's time was fairly odiferous. But before we veer too far into psychobiographical matters, we should consider the threshold of disgust as itself a historical problem. As Norbert Elias has argued, an ever-receding threshold of disgust, shame, embarrassment, aggression, and perception is a subjective condition of European modernity: "Social life ceased to be a danger zone in which feasting, dancing, and noisy pleasure frequently and suddenly give way to rage, blows, and murder, and becomes a different kind of danger zone if individuals cannot sufficiently restrain themselves, if they touch sensitive spots, their own shame-frontier or the embarrassment-threshold of others. In a sense, the danger-zone now passes through the self of every individual. Thus people become, in this respect too, sensitive to distinctions which previously scarcely entered consciousness."[51] In other words, as social life becomes "safer" and more rationalized, as people put some distance between their everyday life and their perceptible mortality, the messiness of the natural world becomes more difficult to bear. Hence, people are more easily disgusted or frightened; hence, people perceive more and more subtle action as aggressive or improper, and, hence, they become more sensitive to ever-smaller details of the data provided by their senses. As an instrument, the stethoscope is an artifact of these tendencies. As a practice, mediate auscultation codifies a whole set of bourgeois sensibilities into medical knowledge. Laennec's objections to immediate auscultation clearly touch on shame frontiers and embarrassment thresholds: the stethoscope can even hear through a patient's clothes and relieves male doctors of the awkwardness of touching women's breasts. Bourgeois decorum can be upheld even among the sick and their healers. So Laennec's disgust at his patients is an eminently cultured or cultivated disgust. But, as the stethoscope codifies disgust, it is also about ever-increasing sensitivities: subtle changes in liquid or gaseous motions; the tiny, barely audible details of a patient's breathing or heartbeat. Where the audible distinctions among patients' bodily sounds barely entered the physicians' consciousness, they would soon preoccupy it, providing the necessary clues to the true state of the patients' bodies.

Of course, distinctions between sounds were not the only salient distinctions in medicine at the turn of the nineteenth century. Mediate auscultation was very much about mediating class distinctions. In the clinical setting at this time, the physician was almost invariably of a higher class status than the patient; and Laennec was no exception. Of 770 patients described in Laennec's records, there are occupations listed for 662. None of them are doctors, lawyers, politicians, aristocrats, or musicians. Only 10 of 234 women listed were housewives. Laennec's female patients were day laborers, maids, lingerie makers, porters, masons, dressmakers, and so forth—in other words, they had to work for a living. A quarter of his male patients worked in the construction industry, with most of the rest divided among textiles, equipment and maintenance jobs, and unskilled labor.[52] This information tells us that, although Laennec was not particularly wealthy, he would most often have been of a higher class position than were his patients, men or women. Only with the professionalization of medicine and increasing standards of cleanliness, along with urbanization and the gradual specialization of medical knowledge, would the middle and upper classes venture into hospitals more frequently.[53]

Doctors like Laennec thus occupied a strange position. An aspiring middle-class profession found itself conducting work in one of the culture's most reviled spaces. Laennec, like his contemporaries, thought that work in a hospital was essential to learning the methods of mediate auscultation.[54]

relied heavily on the patients' subjective accounts of illness, their personalities and manners of expression, and less on their own perceptions. Physical examination was usually limited to the taking of the pulse and occasionally to viewing the body.[61] Beyond the patient's speaking voice, the sounds of the body were totally disregarded: one physician was so shocked that he could hear a patient's heartbeat from the bedside that he called it "almost incredible." Another, when asked by his own patient the meaning of a "blubbering sound" in the chest, could offer only a meager guess.[62] Without a hermeneutic for hearing patients' bodies, the nonverbal sounds that they made were meaningless. Even the voice itself was not considered to be a physical phenomenon. For doctors, what the patient said was essential for diagnosis, but the sound of the patient's speech was almost wholly irrelevant.

The growth of physical examination in the eighteenth century coincided with a change in orientation toward the body as a whole. Accompanying the changes in diagnostic methods was a change in theories of disease, from an understanding of disease as simply an imbalance of the bodily humors to the idea that different symptoms might relate to entirely different diseases. As the eighteenth century wore on, efforts to classify diseases on the basis of observations of patients (and less and less on the basis of personal narrative) gave way to autopsies to better track the marks left by disease on internal organs: "The practice of dissecting bodies to find physical evidence of disease began to transform some eighteenth-century physicians from word-oriented, theory-bound scholastics to touch-oriented, observation-bound scientists."[63] This kind of physical observation brought with it the requirement for new methods. Thus, visual, tactile, and audile techniques of examination increased in importance as medical empiricism gained currency: physicians had to revitalize old techniques of examination and develop new ones.[64]

As with Laennec's disgust at his patients, this new sensory sensitivity to small and detailed phenomena represents one of the hallmarks of European-bourgeois "modern" subjectivity. Doctors were becoming "sensitive to distinctions which previously scarcely entered consciousness."[65] The sound of a patient's heartbeat or the blubbering sound in a patient's chest moved from being the curious epiphenomena of an illness to indices of its exact nature, state, and case. As doctors oriented their senses more toward details and minutiae, these classes of phenomena became increasingly significant as signs. Sounds always present to the senses became meaningful in new ways, and doctors sought modes of listening that would give them full access to that new, meaningful audible world.

This is not to say that a physical examination that made use of the doctor's senses was invented in the eighteenth century. One can find examples of auscultation and other acoustic methods of examination throughout medical history. Hippocrates is usually cited as the first written example of immediate auscultation, with a long list of followers.[66] But the privileging of sensory data and the explicitly empiricist orientation to medical knowledge was a new development. This shift is apparent when we consider a kind of "in-between" document: Leopold Auenbrugger's monograph entitled *Inventum Novum,* published in 1761. Auenbrugger's book was perhaps the most significant example of audile-tactile examination prior to Laennec's. Auenbrugger's treatise is notable because it shifts responsibility for the apprehension of disease from the speech and appearance of the patient to the doctor's senses. Auenbrugger distrusted the accounts of his patients and wanted to make diagnoses by "the testimony of my own senses," thereby displacing the centrality of patients' own narrative accounts of their illnesses.[67] The technique that he advocated was called *percussion,* the striking of the body to get a sense of its interior composition. His technique was likely derived from watching his father tap on casks of wine or beer to check their level; his audile orientation probably came from his interest in music. But Auenbrugger's treatise was short, vague, and incomplete. He neither systematized his observations nor provided a clear explication of his practice. In fact, some physicians confused his procedure with an older practice called *succussion,* which involved listening for fluid in the chest by physically shaking the patient.[68] In other words, Auenbrugger had the empiricist bias, but he did not carry it through toward a systematic approach characteristic of the emergent scientific worldview.

Percussion did not find much favor in the medical profession until Laennec's time. A variety of conditions mitigated against Auenbrugger's ideas immediately catching on. In the 1760s, there was still a widespread prejudice among doctors against engaging in physical activities in diagnosis. While surgeons used their hands and instruments, physicians still shied away from the trappings of physical labor on behalf of their patients. Even at the Spanish Hospital in Vienna where he worked, most of the responses to Auenbrugger's research were initially negative.[69] Auenbrugger did little to promote his work, and his treatise circulated little outside German-speaking areas until the turn of the nineteenth century: Rozière de la

would take on a life of its own. Mediate auscultation enabled the movement of the primary site of knowledge in pathological anatomy back from the dead to the living. Although Laennec's mode of analysis was grounded in pathological anatomy, it was a significant departure from its more orthodox applications because he mixed anatomic and physiological approaches. He was less concerned with the status of the organs themselves than their movements, relations, and functions. Mediate auscultation was a hydraulic, physiological hermeneutics, charting the motions of liquids and gases through the body and relating those movements to issues of function. In the age of auscultators, hearing surpassed sight in diagnostic precision. Only in the patient's death could vision again take hold as the primary sense used by doctors for diagnosis (although the invention of anesthetic allowed for a more visually contemplative orientation toward surgery). This primacy of audile diagnosis would continue into the twentieth century.[76]

Techniques of listening are thus central to modern medicine as we know it. In the founding moments of modern medicine, listening moved from an incidental modality of intersubjective communication to a privileged technique of empirical examination. It offered a way of constructing knowledge of patients independent of patients' knowledge of themselves or what they might say about themselves. The truth of a patient's body became audible to the listener at the other end of the stethoscope.

As with Laennec's understanding of auscultation as an acutely active form of listening, his approach to patients' voices was foreshadowed by his teacher Buisson. Buisson distinguished among three forms of voice: the voice "strictly speaking"; song; and the spoken word. In the form of a doctor-patient exchange, speech was still essential for Buisson. But his notion of the voice "strictly speaking" was a physiological function, the voice as sound. In other words, the voice was useful for diagnosis, not only because of what patients said, but because it could function as a timbral index of interior states of the body. Buisson's notion of the voice "strictly speaking" was therefore a functional understanding of speech. The voice was a physiological process, "invested with intrinsic and extrinsic elements reflecting the mind and the biology of its owner."[77] Following Auenbrugger and Buisson, Laennec found listening to the patient's body a means of diagnosis superior to listening to the patient's narrative account of the illness. The sounds of the patient's body were independent of the patient's free will: patients could not "conceal, exaggerate or lessen" the sounds that their bodies yielded on examination by mediate auscultation.[78] Like Auenbrugger, Laennec trusted his own senses above anything the patient might say or do. Patients' speech might deceive, but their bodies would yield up their own truth on examination. As Stanley Reiser argues,

> The stethoscope focused the attention of physicians on a new class of disease signs—the sounds produced by defective structures in the body. . . . A model of disease, deduced from these sounds and from the assorted lesions in the body found at autopsy, largely replaced the model constructed from the patients' subjective impressions and the physicians' own visual observations of the patient. The physician's withdrawal from such person-centered signs of illness was increased by the fact that the auscultatory process required the physician to isolate himself in a world of sounds, inaudible to the patient. Moreover, the growing success with which disease could be diagnosed through auscultation encouraged the physician to favor techniques that would yield data independent of the opinions and appearance of the patient.[79]

The technique of mediate auscultation (and not the stethoscope per se, as might be inferred from Reiser's language) was predicated on a relativization of the human voice. In diagnosis, the voice became one sound among many contending for the physician's attention in the audible world. Frequencies were frequencies.

The pedagogy of mediate auscultation facilitated a general shift in diagnosis from a privileging of the mouth (via voice and speech) as the most important sonic location on the body to a diffusion of bodily sounds to be apprehended and sorted out in the ear. The history of audile diagnosis thus runs parallel to the shift from automata to tympanic machines. The voice became one contender among many for the trained auditor's attention. In any case, the voice was the only sound capable of speaking an untruth in Auenbrugger's and Laennec's hermeneutics.[80] While other sounds could conceivably mislead a doctor and lead to misdiagnosis, they did not actively deceive—interpretation was simply a form of physician's error. Speech, on the other hand, could be understood perfectly and still mislead a person.

This displacement of the voice and the patient's own subjectivity goes even further since, until the discovery of X-rays at the end of the nineteenth century, auscultation was the only available method for apprehending the interiority of patients' bodies without physically cutting them up. In fact, Reiser goes so far as to say that the physician could, "in a sense, autopsy the patient while still alive,"[81] a statement that makes sense only given the privileged status of autopsy in the acquisition of medical

Jonathan Sterne

The Audible Past

CULTURAL ORIGINS OF SOUND REPRODUCTION

DUKE UNIVERSITY PRESS Durham & London 2003

SIMONE
POS
£20

power and beauty of tone that make him the greatest of all tenors," declares the ad.

In both cases, a simple picture and some straightforward ad copy offer the reader a deceptively complex set of philosophical claims about sound reproduction. The medium in question is recording, but the ads' claims index some fundamental issues surrounding sound's reproduction. The ads present a general equivalence of singer and recording—the two stand side by side; they are written of in parallel phrases. But consider the actual claims about Farrar and Caruso for a moment. In both ads, the person is placed side by side with the technology—either the record player or the record. In both cases, the person and the medium are the same size. The ads establish their equivalence by manipulating images and by providing text that is taunting and tautological (tauntological?): "Which is which?"; "Both are Caruso." The very claim that the Victor record delivers *all* the tone and power of Caruso anticipates the possibility that the recording might not in fact have *all* the tone and power of the singer. To assert that both are Caruso implies that one or both might *not* in fact be Caruso and that, in any event, the point requires some demonstration. Farrar, Caruso, records, and talking machines: these ads protest too much.

Although the philosophy of reproducibility in these ads and the questions that they raise are likely familiar by now, early discourses of and around sound fidelity reveal fights over the ground rules of reproducibility. Before sounds could be captured by electric devices for measuring signals, *fidelity* was an amazingly fluid term, signaling the plasticity of practices of and around sound reproduction. Even basic technical discussions—whether a given sound technology "worked"—were loaded down with implied theories of reproducibility. Functional, aesthetic, social, and philosophical issues were bound together from the very beginnings of sound reproduction. During the early history of commercially available sound-reproduction technologies, from roughly 1878 through the 1920s, these issues were both practical and philosophical. People had to learn how to understand the relations between sounds made by people and sounds made by machines. Over time, certain practical understandings would come to sediment around the process of sound reproduction and its attendant relation of original and copy. This chapter tells the story of how these understandings came to cohere and develop over time.

The discourse of fidelity is most common and most developed in discussions of sound recording, as opposed to other forms of sound reproduction. This is likely because of the increased ease of careful listening and

Which is which?
GERALDINE FARRAR
You think you can tell the difference between hearing grand-opera artists sing and hearing their beautiful voices on the *Victor*. But can you?
Victor Talking Machine Company, Camden, N. J., U. S. A.
Victor
His Master's Voice

29

comparison made possible by recordings as well as by their mobility. Yet the centrality of recording to the discourse of fidelity should not be mistaken for a theoretical privileging of recording as such in my own account: my argument is that the problems described under the rubric *sound fidelity*—some of the key questions that orbit around the concept *reproducibility* itself—apply equally, although in slightly varying ways, to the other kinds of sound reproduction.

Although I will argue that the logic of "original" and "copy" does not adequately describe the process of sound reproduction, one cannot deny that questions of the relation between originals and copies have formed a central preoccupation of twentieth-century theories of communication and

Figure 29. "Which Is Which?"—Victor Talking Machine advertisement, 1908 (courtesy Archives Center, National Museum of American History)

Debates about the authenticity of copies with respect to a truly authentic original miss a more fundamental issue: the very nature of originality and authenticity is transformed in the context of reproducibility. Walter Benjamin's famous essay "The Work of Art in the Age of Mechanical Reproduction" makes this argument with respect to film. At first blush, Benjamin appears to advance the "loss of being" hypothesis since he coins the term *aura* as "that which withers in the age of mechanical reproduction." Aura is the unique presence in time and space of a particular representation, its location in a particular context and tradition. In freeing that which is reproduced from a particular time, space, and tradition, mechanical reproduction destroys aura.[11] The copy is that which is similar to the original but has failed to be the same, "the pretender who possesses in a secondary way."[12] But to stop here would be to miss the point of the entire essay.

Benjamin immediately qualifies his definition of *aura* in a note: "Precisely because authenticity is not reproducible, the intensive penetration of certain (mechanical) processes of reproduction was instrumental in differentiating and grading authenticity." In *this* formulation, the very construct of aura is, by and large, retroactive, something that is an artifact of reproducibility, rather than a side effect or an inherent quality of self-presence. Aura is the object of a nostalgia that accompanies reproduction. In fact, reproduction does not really separate copies from originals but instead results in the creation of a distinctive form of originality: the possibility of reproduction transforms the practice of production. This is the expressed purpose of Benjamin's analysis of film in the second half of the essay. His fascination with film lies in its composition, its artificiality. He writes of shooting and editing practices "in the studio": "The mechanical equipment has penetrated so deeply into reality that its pure aspect freed from the foreign substance of equipment is the result of a special procedure, namely, the shooting by the specially adjusted camera and the mounting of the shot together with other similar ones. The equipment-free aspect of reality here has become the height of artifice; the sight of immediate reality has become an orchid in the land of technology." Now, clearly, Benjamin connects artifice with artificiality. Nature, as "immediate reality" disappears for him. But this is because reproduction highlights the possibility of reality having an immediate self-presence in the first place: authenticity and presence become issues only when there is something to which we can compare them. For Benjamin, this process is best embodied in the cinema; it was "unimaginable anywhere at any time before this."[13] It is also an apt description of the condition of originality in the age of reproduced sound—whether we are considering recording, telephony, or radio. As a studio art, sound reproduction developed shortly before and then alongside film.[14] The possibility of sound reproduction reorients the practices of sound production; insofar as it is a possibility at all, reproduction precedes originality.

Nowhere is this more clear than in our anachronistic use of the word *live* to describe performances that are not reproduced. As Sarah Thornton has written, the term *live* as we apply it to music (and potentially to all face-to-face communication) entered "the lexicon of music appreciation" only in the 1950s, as a part of a public relations campaign by musicians' unions in Britain and the United States. Although our accepted idea of *live* music emerged from a serious labor struggle over musicians' abilities to make a living at their trade, the term has taken on a life of its own in aesthetic discourse, completely abstracted from its original context. At the time of the unions' public relations campaigns, the word *live* was short for *living*, as in *living musicians*: "Later, it referred to music itself and quickly accumulated connotations which took it beyond the denotative meaning of performance. . . . Through a series of condensations . . . the expression 'live music' gave positive valuation to and became generic for performed music. It soaked up the aesthetic and ethical connotations of life-versus-death, human-versus-mechanical, creative-versus-imitative."[15]

As they are anguished over in the discourses of fidelity, speculations on the relation between original and copy operate as placeholders for concerns about the social process of sound reproduction itself. By restoring this sense of process to sound theory, we restore sociality and contingency to our theories of reproduced sound. In short, we treat reproduction as an artifact of human life instead of as an ontological condition. To do otherwise is to take one "socially constructed practice of sound production and reception" as the ground for discussing and evaluating all others.[16] We should consider sound events in terms of their own social and cultural location, rather than beginning our analysis of reproduced sounds by treating each as a contender for the right to reign over the domain of *all* sounds.[17]

This question of location is urgent in early discourses of fidelity. The early history of sound fidelity, as an operative concept, a technical principle, and an aesthetic, is a history of beliefs in and about sound reproduction as well as a history of the apparatuses themselves. Fidelity, after all, is the quality of faithfulness to some kind of pact or agreement. The very choice of the term *fidelity* (first applied to sound in 1878) indicates both a faith in

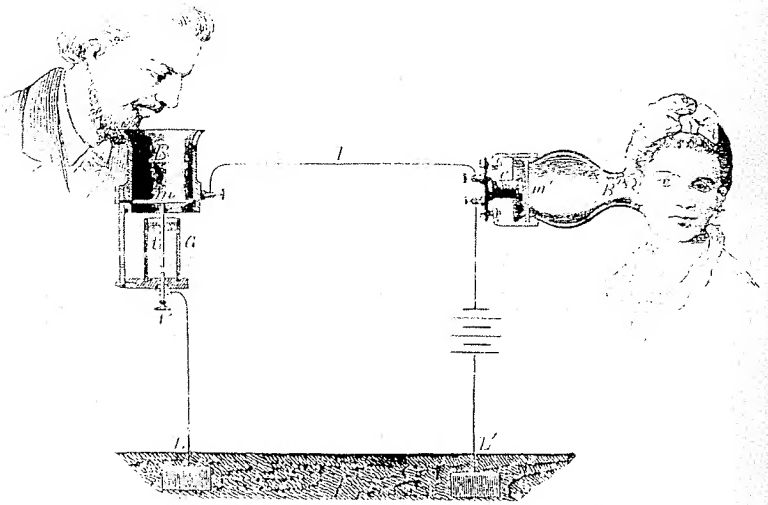
27 I. X 1927
The human voice is human on the New Orthophonic Victrola
A GREAT artist sings, and thousands press for admittance. Many wait in line for hours. Some are turned away, disappointed. Attend the operas, by all means, but enjoy these same golden voices in your own home . . . whenever you wish . . . through the new Orthophonic Victrola and Victor Records
This amazing instrument brings you vocal music in all its original purity and power. Tones of correct natural volume. Tones neither too thin nor too loud, but full, round and mellow. The new Orthophonic Victrola catches the very personality of the artist!
In no other way can you have such singing in your home, for the Orthophonic Victrola is based upon Victor's new scientific principle, which makes possible the full, free flow of sound unhampered and unmarred.
Words can give you but the faintest impression of the thrill in store for you at the nearest Victor dealer's. He will demonstrate it for you. Go . . . in your most skeptical mood! There are many beautiful models of the Orthophonic Victrola at many prices. Hear them today
The Orthophonic Victrola furnishes the best music for the least. It never disappoints. The Credenza Model Number Eight shown above
The New Orthophonic
Victrola
PROTECT YOURSELF! Only the Victor Company makes Victrolas
VICTOR TALKING MACHINE CO.
CAMDEN, NEW JERSEY, U. S. A.
30

Figure 30. "The Human Voice *Is* Human"—Victor Victrola advertisement, 1927 (courtesy Archives Center, National Museum of American History)

outcome. Unlike the sounds of the body heard through the stethoscope or the staccato Morse code, the reproduced sounds apprehended through audile technique were now supposed to be transparent, that is, *without a code*, and therefore immediately apparent to any listener who knew the technique. Ultimately, this would lead to a conflicted aesthetic of reproduced sound, where the ideal state for the technology as vanishing mediator would continually be set in conflict with the reality that sound-reproduction technologies had their own sonic character. The aesthetic notion that the best medium was one that was the "least there" thus served as an inverted image of sound reproduction's social existence: the more "there" it was, the more effective it could be.

Studios and Networks as Diagrams of Sound Reproduction

Any medium of sound reproduction is an apparatus, a network—a whole set of relations, practices, people, and technologies. The very possibility of sound reproduction emerges from the character and connectedness of the medium. Early graphic representations of sound reproduction frequently gesture to this "networked" aspect of the seemingly mechanical process of reproduction; the orders depicted in early graphic representations of sound reproduction show sound-reproduction technology to be embedded in networks that are simultaneously social and technical.[21] Consider the many social connections in even a simple representation of radio broadcasting. RCA's depiction of how radio works (figure 31) shows how even a "merely" technical network implies a larger field of social relations. The singer and the hearer are at two opposite ends (although there are many more than two people) of a vast technical network. The sound becomes electricity, is manipulated as electricity, and is remade as sound. Although the imagery is heavy on wattage and vacuum tubes, it also implies a larger social sphere: the theater, RCA's control room and broadcast transmitter rooms, the broadcast area, home reception. Implied just beyond the picture are the theater audience, the technicians servicing the microphones and transmitters, the radio network people setting up the concert as a radio performance, the musicians' unions, the store where our domestic listener purchased her radio set, and the rest of the radio listeners within the hundred-mile radius of the station. In short, this picture uses the technology of radio as a placeholder for a recurring relation among people, practices, institutions, and

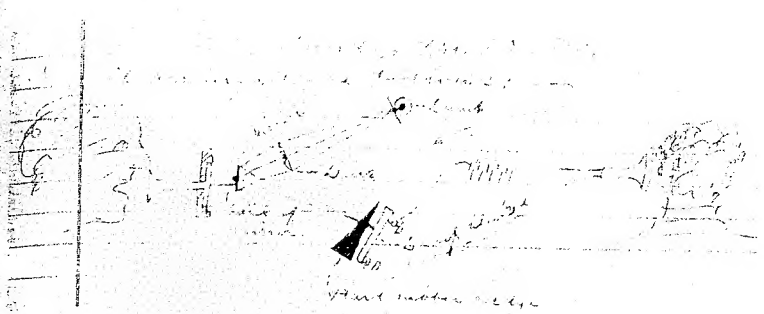


33

participation of the listening white woman goes beyond eroticizing the connection itself. Andreas Huyssen's famous argument that mass culture is represented as female seems apropos here as well, but with a twist. These images of women participating in the sound-reproduction network are not metaphoric—as are Huyssen's examples. Rather, they are literal. The emergent media of the late nineteenth and early twentieth centuries grew alongside a whole class of women who were full participants in mass culture—and that participation was on an unprecedented scale. The listening white woman thus supplanted the image of the Victorian woman expressing herself and entertaining the family at the piano. This change was as much a result of real participation of women in emerging networks of sociability—including the networks of sound reproduction—as it was a result of the "image" of mass culture and new media as somehow feminized.[22]

Although popular and commercial images featured women, lab drawings and patent caveats tended more to feature men. Since research labs were almost entirely men's spaces at the time, this should come as no surprise. Still, these images also amply illustrate the "network" sensibility articulated around sound-reproduction technologies. In a series of lab draw-

Figure 33. Artist's illustration of Elisha Gray's telephone, 1890



34

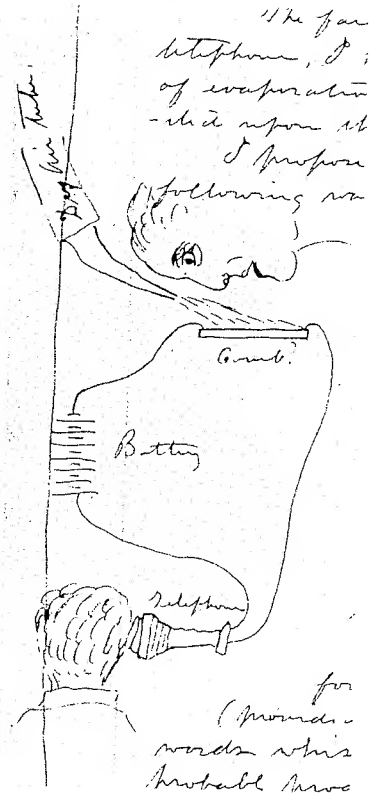


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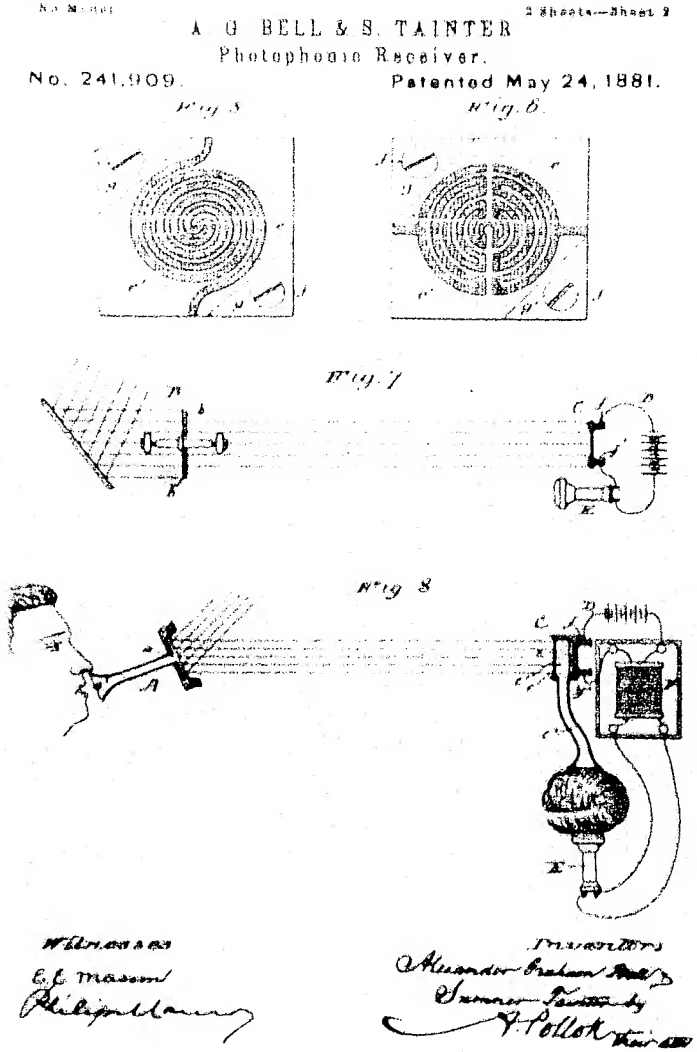
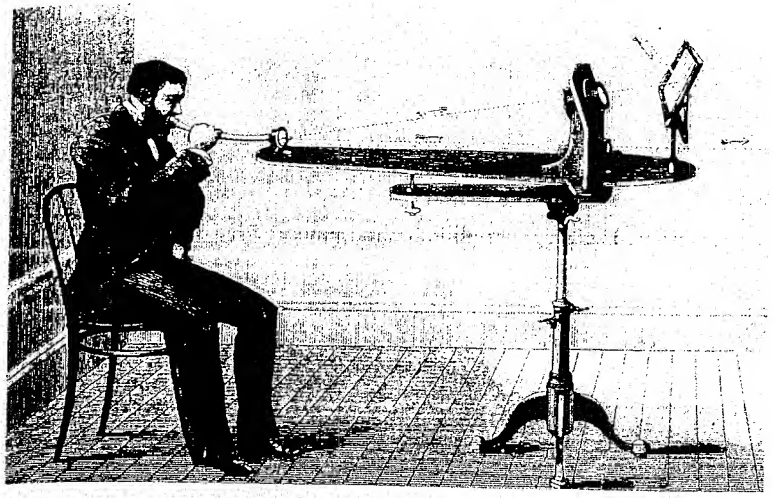
Figure 34. Drawing from the home notebook of Charles Sumner Tainter, 3 April 1881 (courtesy Archives Center, National Museum of American History)

Figure 35. Drawing from the home notebook of Charles Sumner Tainter, 19 November 1882 (courtesy Archives Center, National Museum of American History)


A. G. BELL & S. TAINTER
Photophonic Receiver.
No. 241,909. Patented May 24, 1881.
Fig. 5.
Fig. 6.
Fig. 7.
Fig. 8.
Witnesses
E. C. Mason
Philip Mauro
Inventors
Alexander Graham Bell
Sumner Tainter
A. Pollok

38

Figure 38. Another patent drawing for photophonic receiver, 1881



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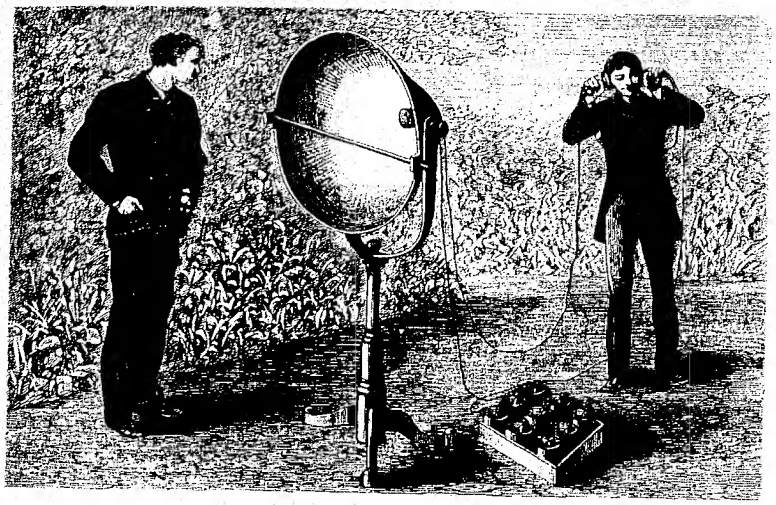


40

involve ears and mouths in close proximity. Although they are now attached to living people—and modeled in the machine itself—they retain a clear functional importance in the images. They are strictly interchangeable from the perspective of the machine's functioning; they are parts of the process. The tympanic function is now doubled—once immediately inside

Figure 39. Speaking to the photophone, 1884
Figure 40. Listening to the photophone, 1884

spontaneity interfered with the "spontaneous" capture of the street scene. Recording did not simply capture reality as it was; it aimed to capture reality suitable for reproduction. Spontaneity was spontaneous only through artifice.

Considered as a social process, sound reproduction has irreducible social and spatial components. Without studios, and without other social placements of microphones in performative frames that were always real spaces, there was no independent reproducibility of sound.[27] The studio in particular implies a configuration of bodies and sounds in space, a particular ordering of practices and attitudes. Its significance is at once technical, social, and spatial. The studio becomes a way of doing things and a social frame for reproducibility. As with any cultural practice, sound reproduction has an acutely spatial dimension, and the space of the studio was radically different from other performance spaces. Performances for reproduction focused on bodily disposition and affective states. This is contrary to the often-made claim that reproduction decontextualizes performance and deterritorializes sound. Considered as a product, reproduced sound might appear mobile, decontextualized, disembodied. Considered as a technology, sound reproduction might appear mobile, dehumanized, and mechanical. But, considered as a process, sound reproduction has an irreducible humanity, sociality, and spatiality.

From the very beginning, recorded sound was a studio art. From before the technology was commercially available, users were aware of the special conditions of sound production accompanying reproduction. In the midst of experimentation, Chichester Alexander Bell wrote of the physical contortions necessary to get one's mouth close enough to the mouthpiece to get a good recording: "With the mouth in such a position, not only is it very difficult to talk in a natural manner, but it is obvious that sound waves within the mouth-piece must interfere with each other."[27] Even a cramped loft studio was better than the best spontaneous conditions. Eldridge Johnson, commenting on his work with the gramophone, remembered: "We had no place for the singer to record except in a loft that you got to with a ladder. I would scurry around and get some poor devil to come and sing for a dollar in real money and then I'd push him up the ladder and try to get a record."[28] The studio was a necessary framing device for the performance of both performer and apparatus: the room isolated the performer from the outside world, while crude soundproofing and physical separation optimized the room to the needs of the tympanic machine and ensured the unity and distinctness of the sound event being produced for reproduction. As Steve Jones points out, sound engineers quickly learned to prefer studio recording to on-location recording because the studio allowed them to control the acoustic environment much better—and thereby to control the actual sound of the recording.[29]

Like those created for sound recording, the sound events broadcast by radio were primarily not existing ones but manufactured ones. An early account of the broadcasting of opera emphasizes the qualities of studio work: the smallness of the room, the abstraction of the music and the singing from the rest of the operatic performance, and the special training of the singers. After getting the singers to abandon all visual aspects of their performance—facial expressions, movements, costume—the issue of "maximum tonal effect" became paramount: "This was accomplished by introducing a shifting process, each singer having a fixed position from which he moved forward, backward, and sidewise according to a prearranged scheme, precisely like a football line that opens and shuts and moves by a code of signals."[30]

The title of the article from which this quotation was taken eliminates any doubts about the author's view of the difference between live performance and performance for reproduction: "How Opera Is Broadcasted: Difficulties That Must Be Overcome in Order to Obtain the Best Results; How Singers Must Be Especially Drilled and Grouped, and How the Opera Must Be Revised, Interpreted, and Visualized to Make Up for the Lack of Action, Costumes, and Scenery; Artists Are Put in a Musical Straitjacket; Moving, Whispering, Even Deep Breathing a Crime." Clearly, the author had the standard disdain for recording shared by some performing artists of the time. But analysis can disentangle the description of the event from its aesthetic evaluation. Although you or I might like recorded music much more than this author does, his description of the recorded operatic performance is essentially correct. The physical placement of performers during the recording process is different from that during live performance, as is the entire presentation of the opera. This is the salient point for all reproduction: it is not just eavesdropping on live performance; it is a studio art.[31]

Location was everything. Studio work was widely understood as a practice entirely different from live performance. Early accounts of singers' performances for reproduction frequently focused on bodily disposition and affective state. Thomas Watson wrote that, when a manager replaced him with a hired singer for a telephone demonstration, the singer was

The attendant then went over to the transmitter and announced that I would sing two songs. . . . This I then proceeded to do. At the end, there was the same dull, empty silence. I would have given anything for even a pathetic pattering of applause. It was my meat and drink — my board bill. But no — not a sound, not a flutter of a programme. I felt like a bell tinkling in a vacuum — you know the example we used to have in high school in physics. I swore to myself that of all the stupid experiences, singing through a tin can was the most stupid."

Duthernoy's experience had a happy ending — a few phone calls to the station requesting encores assured him that the audience was listening and afforded a degree of interactivity, even if it was delayed. Performer-audience interaction was replaced with listener response and delayed gratification: "When unseen and unknown people clamor to hear you sing, it is far more to be desired than the roaring applause in the concert hall."[38] Here was a Protestant ethic for performers! Perhaps that potato-sack-filled room resembled for a few moments the "iron cage" of which Weber had written seventeen years previously.[39] Perhaps Duthernoy had a glimpse of a future, hollow existence. But he put his faith in the machinery, the medium, and his link to listeners, and he felt that his faith was rewarded. Thomas Watson writes similarly of his brief experience performing on the telephone for lecture audiences. Once he mastered performing for the machine, he "always felt the artist's joy when I heard in [the telephone] the long applause that followed each of my efforts."[40]

This truly aural universe of reproducibility, where the ears hang off radios and household furniture alike, points to the strangely human artifice of sound reproduction. Duthernoy's experience remains fairly typical of live performers who first come to a studio situation. He immediately apprehended the difference between performance for reproduction and live performance. All elements of the sonic event are isolated from one another and recombined in an entirely different form of experience. This experience, in turn, is rooted in the sociality of the event. Duthernoy went in assuming that live performance and radio performances are simply two instances of the one social practice. His fear was a result of the realization that they are *not* in fact the same thing. His gratification returned when he managed to convince himself that reproduced is in fact better than live — "far more to be desired." The "live" and the "reproduced" performance practices exist in relation to one another, but they are not the same thing. This was what our novice radio singer learned.

The Artifice of Authenticity

If its reproduction exists even as a possibility, sound production is oriented toward reproduction from the very moment sound is created at a "source." Sound reproduction always involves a distinct practice of sound production. As in Duthernoy's case, the sound event is created for the explicit purpose of its reproduction. Therefore, we can no longer argue that copies are debased versions of a more authentic original that exists either outside or prior to the process of reproduction. Both copy and original are products of the process of reproducibility. The original requires as much artifice as the copy. Philosophies of sound reproduction that reference a prior authenticity that is neither reproduced nor reproducible are untenable since their point of reference — an authentic original untainted by reproduction — is at best a false idol.

Even in this kind of account, authenticity does not disappear altogether, although it does change. Sound reproductions that are acknowledged as wholly artificial by performers or the audience (or both) can still come to have a sense of authenticity. But *this* notion of authenticity refers more to an intensity or consistency of the listening experience. It is a claim about affect and effect, rather than a claim about degrees of truth or presence in a reproduced sound. Certainly, listeners desired reproduced sounds that bore a purely mimetic relation to the events that they purportedly captured. Certainly, performers strove for what they would come to call *realism* in their effects. But, as many critics of film and photography have shown us, reality is as much about aesthetic creation as it is about any other effect when we are talking about media.

The case of a recording that purported to contain the last words of Harry Hayward illustrates the simultaneous desire for early sound recordings to capture events as they happened, the impossibility of that happening, and the resulting artifice of authenticity.[41] Hayward, a member of a prominent Minneapolis family, was hung in 1895 for the murder of Catherine Ging, a young dressmaker who had come to Minneapolis to establish a shop. As collateral on a loan from Hayward to start the shop, Ging had taken out a life insurance policy naming him as the beneficiary. The trial attracted considerable press coverage, as did Hayward's fortune after being convicted. His final days were reported in great detail, and several publications appeared detailing his "confession and criminal life." Following his execution, the *Minneapolis Journal* reported that, on the date of the execution, two men had entered the jail with a large package. Supposedly, this

places and events. The following sampling of descriptive specialties from the 1914 Columbia catalog gives some idea of the breadth of the genre:

Anvil Chorus from "Il Trovatore" (with anvil effect) — Verdi

Arkansaw Husking Bee, An — Pryor

Capture of the Forts at Port Arthur (a scene from one of the Russian forts, with cannonading, and shriek of shells. The Russian Band is heard playing the National Anthem. The Japanese approach, headed by their band playing their National Air, and take possession of the forts, amid loud cries of "Banzai.")

Charge of the Light Brigade March

Chariot Race March (with whistling solo)—Paul

. . .

Evening Chimes in the Mountains (with bell solo)

Forge in the Forest, The (with bells, cock and crow and anvil effects)—Michaelis

Indian Chase, An (gallop)—A. E. Loetz

. . .

McKinley Memorial (introducing President McKinley's last speech, and "Lead Kindly Light" by Brass Quartet)

Mr. Thomas Cat (March comique, trombone imitations)—Zimmerman

. . .

Tone Pictures of the 71st Regiment leaving for Cuba—F. W. Hager[14]

Clearly aimed at a middle-class market, the range of pieces echoes the range of subject matter in other middle-class entertainments: as in vaudeville, there were imitations and comedies; as in stereoscopes and films, there were representations of distant events available for domestic consumption. Depending on the recording, sound reproduction was treated as a form of mediation and representation or an extension of the senses. In each case, the point was not to get as close to reality as possible but rather to establish a kind of auditory realism and, through that realism, present a distinct aesthetic experience. No matter how real the descriptive specialty may have seemed to its listeners, it was a sophisticated artifice. It was use time and exchange time rolled together in a cylinder.

The recordings were very much limited by the parameters of the available technology: narratives were short and to the point, effects rudimentary, and dialogue brief. The experience of hearing these recordings is difficult to retell in print. Some recordings were essentially medleys of music interspersed with brief dialogue and sound effects. Others consisted mostly of dialogue, interspersing the fabricated noises of a horse race or yells of victorious soldiers. Still others re-created actual events such as Theodore Roosevelt's inauguration (which concludes with a spectator saying that he has seen "every inauguration since Andrew Jackson's and this one beats them all!" or fictional scenes such as night in a clock store.[15]

Descriptive specialties were the predecessor of more enduring audio arts, such as Foley effects in film and the use of sound effects in radio drama. Rudolf Arnheim wrote that radio art allowed for "natural sounds" to be raised to a "super-realistic level."[16] While Arnheim had in mind the radio drama, the principle of "imitative art" in sound creation that he distilled was present from the very beginning. Many of the techniques of "imitative" art later standardized for sound film and radio drama were first developed for descriptive specialties. Moreover, descriptive specialties emphasized for listeners the "realism" of the medium, even if audiences were aware of the fabrication of the actual performance on record. Like "primitive" cinema, where the camera's ability to document motion is highlighted, descriptive specialties emphasized the possibility for sound reproduction to present realistic and fanciful accounts alike of events over time.[17]

Of course, it did eventually become possible to reproduce events as they happened for a listening audience. But, even here, the auditory reproduction of the actual event is highly contrived; the audience hears not so much the event itself as a performance concurrent with the event. RCA's experimental broadcast of the Dempsey-Carpentier fight is an excellent example of this: from possibly the first sporting event broadcast to a mass audience, play-by-play reporting—filtering and shaping at the point of production for reproduction—was essential to the success of the endeavor. RCA received hundreds of enthusiastic letters from those who heard the broadcast. One listener wrote, "The broadcasting of the fight was simply wonderful. Even the gong sounded plainly as could be. . . . Never expected to hear a 'world crier' by radiophone. You must have been heard over thousands of miles. Some 'Town Crier,' I'll say. Almost thot [*sic*] I was in the front row at the ringside when you counted Carpentier out. It was realistic and impressive to the highest degree." The criterion here is realism, not reality itself. An internal RCA report was clear on this matter: RCA broadcast a "voice description" of the fight, not the fight itself.[18] Once again, to borrow Roland Barthes's language, the point of the artifice is to connote denotation, to construct a realism that holds the place of reality without being it.[19] Like the descriptive specialty, the live radio broadcast did not so much capture the event as it became an event in itself. Even today, voice descrip-

telephone is well-known: American children still learn in school that Bell said, "Mr. Watson — Come here — I want to see you," although this interaction did not become public knowledge until 1882, six years after the telephone was introduced to the public. This famous remark brought Watson downstairs to Bell to repeat what he had heard, verbatim. The men then changed places, and Bell listened to Watson read a few passages from a book. Bell wrote in his notebook two days later: "The effect was loud but indistinct and muffled. If I had read beforehand the passage given by Mr. Watson I should have recognized every word. As it was I could not make out the sense — but an occasional word here and there was quite distinct. I made out 'to' and 'out' and 'further'; and finally the sentence 'Mr. Bell do you understand what I say? Do — you — un — der — stand — what — I — say' came quite clearly and intelligibly."[51] Intelligibility was clearly linked to conventionality at this early stage. Speech that could be easily interpreted on the basis of little actual audio information — a call, a query, a cliché — was more likely to be understood over the telephone's lines. Bell's "if I had read beforehand" qualification shows the degree to which early technological reproduction relied on the human capacity for linguistic reproduction: had he known in advance what was to be said, he might have heard what was said! Listeners were lending their memories to machines.

The telephone's public debut at the Philadelphia International Exposition on 25 June 1876 offers an even more elaborate example of this connection between functional demonstration and aesthetic choice. In the southeast corner of the main building, Alexander Graham Bell set up a small table, where he laid out his apparatus for the exposition: a harmonic telegraph, a modified König manometric flame, and the receiving apparatus for a rudimentary telephone (the transmitter was about a hundred yards away at the north end of the wing). Bell spent the day touring the technical exhibitions with a group of over fifty people, including the exhibition judges, noted scientists, and the emperor of Brazil. Bell's turn came at the end of the day and in one of the hottest parts of the hall. Without the emperor's interest, there might have been no demonstration of the telephone that day. Of course, one can only speculate as to why the emperor was so particularly interested in the telephone. But, as I noted in the previous chapter, the very modern-seeming idea of new media bringing people together has an analogue in a very old idea of the figure, voice, and presence of a ruler bringing people together.[52]

Whatever the emperor's motivation, the result is now a canonical story in telephone history. After a demonstration of harmonic telegraphy and the electric modulation of a vibrating diaphragm through the manometric flame, Bell moved to the demonstration of his telephonic apparatus. Sir William Thomson, a well-known Scottish scientist, was the first to listen to the apparatus, as the noted elocutionist Bell retreated to the north end of the gallery for the first ever "mediated" public vocal performance. Thomson first heard singing and then made out the words, "Do you understand what I say?" which he shouted in repetition. Running to Bell to confirm his audition, he quickly returned to the receiver for more. Emperor Dom Pedro II of Brazil then took his turn: Bell was now reciting *Hamlet* — "to be or not to be." Bell spoke, the emperor heard, the emperor repeated. Even Bell's later competitor Elisha Gray heard: "I listened intently for some moments, hearing a very faint, ghostly, ringing sort of a sound; but, finally, I thought I caught the words, 'Aye, there's the rub.' I turned to the audience, repeating these words, and they cheered."[53] The marvel of the machine was not that it reproduced sound well (of course it didn't) but that it reproduced sound at all; this was cause for applause in and of itself: here was an aesthetic of function.

Perhaps it should be no surprise that early aesthetic choices aimed precisely at proving functionality. At the same time, we must not forget that these choices are aesthetic, not simply instrumental. That fall, *Scientific American* authenticated early telephone experiments and demonstrations by printing transcripts maintained by Bell and Watson at the Boston and Cambridge ends of the connection, respectively. The *Scientific American* writer reported that "articulate conversation then . . . took place. . . . The sounds, at first faint and indistinct, became suddenly quite loud and intelligible." Apart from a few minor gaps — Bell's "I think we were both speaking at the same time" in Boston became Watson's "I think . . . at the same time" in Cambridge — the transcripts were more or less the same.[54] Bell and Watson *could* have spoken about anything. That they chose to have a conversation on the phone about having a conversation on the phone highlighted the process, the medium, the relation, and the possibilities of interconnection. Moreover, the simplicity of the conversation topic allowed Bell and Watson to lend a little assistance to the telephone itself. At the level of semantics and reference, there was little meaning to the conversation. At the level of practice, the meaning of the conversation was that the medium worked.

GRAND CONCERT.

VOCAL AND INSTRUMENTAL,

COMPLIMENTARY TO

Miss Clara O. Willard,

AT THE

PRESBYTERIAN CHURCH, HIGHLAND PARK,

Tuesday Even'g, Dec. 29, 1874.

THE BLANEY LODGE QUARTETTE,

FROM CHICAGO.

W. C. COFFIN,	*First Tenor*
W. M. GOODRIDGE,	*Second Tenor*
D. A. KIMBARK,	*First Bass*
C. C. LEFLER,	*Second Bass*

And other Favorite Vocalists will assist, and a Unique and Extraordinary Feature will be the first public exhibition of Elisha Gray's

ELECTRIC TELEPHONE,

" By means of which, a number of familiar melodies, transmitted from a distance, through telegraphic wire, will be received upon Violins and other instruments, within the room.

CONCERT WILL COMMENCE AT 8 O'CLOCK, PRECISELY.

Tickets of Admission, adults, 50 Cents; Children, 25 Cents; Reserved Seats 25 Cents extra. May be secured at Cummings' Drug Store, St. John's Avenue, or at Dr. J. C. Dean's Dental Office, 67 Washington St., Chicago.

Chicago Evening Journal Print, 159 and 161 Dearborn St.

42a

THE

STEINWAY HALL PROGRAMME.

Vol. I. NEW YORK, MONDAY, APRIL 2d, 1877 No. 91.

TELEPHONE CONCERTS.

TRANSMISSION OF MUSIC BY TELEGRAPH.

TRIUMPH OF AMERICAN SCIENCE.

Mr. MAURICE STRAKOSCH has the honor of announcing that the first public performance on Professor ELISHA GRAY'S marvellous

TELEPHONE

will take place on MONDAY EVENING, April 2d. Musical Melodies will be performed in Philadelphia and distinctly heard by the audience in New York.

The following melodies will be performed MONDAY EVENING, April 2, on the Telephone:

1. "HOME, SWEET HOME."
2. "COME GENTIL," (Don Pasquale).
3. "THEN YOU'LL REMEMBER ME," (Bohemian Girl).
4. "LAST ROSE OF SUMMER."
5. "M'APPARI," romance (Martha).
6. "THE CARNEVAL OF VENICE."

The following eminent Artists will appear

MME. CARRENO SAUERET, THE CELEBRATED PIANISTE.
Miss FANNY KELLOGG, THE CHARMING YOUNG SOPRANO.
Miss SALLIE C. REBER, THE HIGHLY GIFTED AND BEAUTIFUL YOUNG VOCALIST.
SIGNOR TAGLIAPIETRA, THE GREAT BARITONE.
THE CELEBRATED YOUNG APOLLO CLUB, of New York, (Mr. W. F. WILLIAMS, Director).
Mr. E. BOSCOVITZ, THE RENOWNED PIANIST, who will perform on the "*Telephone*" in Phila.

Conductors: Mr. MAX LIEBLING and Mr. W. F. WILLIAMS.

Secretary to Asst. Prof. Gray, said

Mr. STRAKOSCH is happy to announce that Professor ELISHA GRAY will be present and superintend personally the performance of the TELEPHONE.

ADMISSION, ... *ONE DOLLAR.*
RESERVED SEAT, ... *ONE DOLLAR AND A HALF.*

Tickets can be secured at Steinway Hall, also at Schirmer's, 701 Broadway, at Butler's, 11 Broadway, and at Schirmer's, 21 Union Square.

FOR EXTENDED PROGRAMME SEE NEXT PAGE.

42b

Figure 42a–b. Posters for telephone concerts (courtesy Archives Center, National Museum of American History). The "telephone" in the left poster was probably Reis's telephone, as neither Bell nor Gray had invented their "speaking" versions of the telephone in 1874.

telephone ad put it, conversation over the phone can be easily accomplished and understood "with practice." Perhaps, then, this is a Puritanical account of sound reproduction because only with love came fidelity.

Fidelity and the Extension of Pure Audition

Both practiced performance and practiced audition were necessary for perfect reproduction. As a studio art (even when within earshot of the neighbors), sound reproduction entailed distinctive practices of sound production. As with mediate auscultation and telegraphy, sound reproduction also required the development of audile technique. Even the earliest experiments were a form of listening practice, and, while this listening practice extended the constructs of audile technique developed earlier in the nineteenth century, it also developed them in new and interesting ways. Although there are few available reflections on *how* one should listen to an experimental phonograph, we can learn a great deal about technique by considering how early users thought about the *sound* of sound reproduction. The members of the Volta Laboratory were some of the few people in this early period focusing on the sound of sound-reproduction technologies, practicing their audile technique while shaping sound technology. We can see this in the relation between Charles Sumner Tainter's list of stated goals for improving the phonograph and his analyses of different experimental apparatus. Tainter had sought a kind of acoustic transparency in sound reproduction: ideally, the medium would disappear, and original and copy would be identical for listeners. In practice, however, this would require listeners to separate foreground and background sounds, to treat the apparatus of sound reproduction as merely incidental to the sounds thereby perceived. In other words, listeners were helping the machines reproduce sound "perfectly."

Tainter's goals for improving sound recording were straightforward enough: durability, accuracy, increased recording time, reproducibility, density (more sound in a small surface area), and ease of use. Here, he echoed Edison's own early concerns about the future development of the phonograph: Edison's list is almost identical to Tainter's, although Edison separates the practical issue of recordings' durability for multiple playings from the conceptual issue of recordings' permanence for the purposes of preservation.[63] Tainter's practical listening work as discussed in his notes was largely directed at functional issues. Evaluations of sound were written in a fairly cursory manner and without much detail: articulation of speech was clear, or it wasn't; the volume of the recording was loud, or it wasn't. Tainter wondered whether he could discern the distinctive qualities of the speaker's voice on the recording, whether he would understand the recording if he did not know what had been recorded beforehand. He sought the "best" surfaces and materials, the best kinds and temperatures of wax, the proper materials for styli, and ideal levels of pressure of stylus on the recording surface.[64] Notes from this period by Tainter's boss, Alexander Graham Bell, are remarkably similar. "It gives a loud sound"; "got a better reproduction by keeping efficient part of the record at a constant distance from the point."[65]

Tainter's aesthetic of transparency committed him to a project of erasing the medium. His ideal was a machine that produced an exact correspondence between original and copy, leaving no mark of its own process. But, as with performers, so it was with listeners: in order to accomplish this transparency, listeners had to lend a little help to the machines. Audile technique required a certain amount of faith—a belief that the machine does or at least will work. In remarkable similarity to Laennec's hopes for the stethoscope, Tainter hoped that elaborate audile technique combined with an effective technology and an appropriate practice of sound production would lead to "perfect" reproduction. But there were some important differences. Laennec posited the human ear as in need of supplementation for the purposes of listening to the body and, therefore, could cast the stethoscope's modifications of the perceived sound as "beneficial." Tainter and his colleagues wanted a supplement that would erase itself: the problem was how to supplement the recording silently—how to bring it in and out of the audible world.

One failed attempt to solve this problem led Tainter to a bizarre physics. Tainter's criteria for a "perfect" record were that changes in the physical character of the recording should correspond exactly to changes in the sonic character (e.g., loudness) of the recording. Tainter assumed that the correspondence between changes in loudness and changes in the physical character of the recording surface would translate into a correspondence between original and copy—and that this correspondence, in the guise of fidelity, would become the gold standard of reproducibility. He concluded that, since the physical contact of the stylus with the recording surface itself has an effect on the tone of the reproduction, "the conditions necessary in order to produce a perfect-record, and an exact reproduction of the

silent, a machine that could hear anything but with no voice of its own—a surrogate appropriate to the audile technique to be employed. Of course, this imagined silence was itself already contingent and framed—listeners have spoken of skips on records and "telephone voices" from the very beginning—but even these "failures" indexed the possibility of perfect fidelity in reproduction. Before it could be a measurable entity, sound fidelity relied on the construction of a social correspondence among different sounds through audile technique, elevated to an almost metaphysical attitude. Sound fidelity was sound's own unique "dismal science"—it was ultimately about deciding the values of competing and contending sounds.

If "perfect" reproduction was initially reproduction that could be barely understood, eventually this pragmatic view would move from the minute details of experimental procedure to the shape of the experimental enterprise as a whole. After five years of experimentation on the graphophone, function was sufficient for marketing—further improvements of tone could come later. When Alexander Graham Bell wrote to his colleagues at the Volta Laboratory that it was time to move from experimentation to development for commercial use, he dictated his letter to a graphophone cylinder and mailed it as *both* a typed page and a graphophone cylinder to the lab. Although the articulation of the graphophone was imperfect, Bell argued that its commercial use was a practical possibility:

> I have no doubt that the articulation of the telephone can be greatly improved and yet it [*sic*] in spite of the imperfections of the instrument—hundreds of thousands of telephones are in daily use.
>
> I am quite sure also that the Phonograph in its present form may be made of great use—and I would, therefore, urge upon you both the importance of devoting attention to the mechanical details of the apparatus rather than spend all your time in attempting to improve the *character* of the articulation. . .
>
> I hope you understand all that I have said. Spoken to Mr. Tainter's Paper Cylinder phonograph this 14th day of June 1885.
>
> In proof thereof witness my voice!
>
> Alex. G. Bell[7]

Bell's voice arrived as an afterthought to the letter, and the recording was less durable than the paper and typewriter with which the written portion of the message was conceived: the written version is the only surviving part of the letter.[8] The letter thus carried with it a double signature as a failsafe redundancy ensuring that its point would come through. the letter ensured the intelligibility and authenticity of the recording; the recording "proved" the claims in the letter.

As the insurance embodied in this example suggests, the commercial development of sound-reproduction technologies often *preceded* practical or mechanical reliability. The business phonograph was a colossal failure in the early 1890s largely because it was not a reliable machine or even very good at what it did.[9] Conversely, early telephone conversation was a learned skill, and developing a good ear for telephony was essential for making use of it. Early sound-reproduction technologies were oriented around an aesthetic of transparency, but it was enough to produce an apparatus that people imagined could work perfectly.

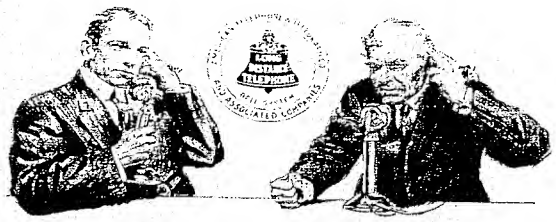
From Phone Tests to Tone Tests: Machines to Believe In

It was one thing for early developers to exercise their imaginations and come up with a construct of "perfect fidelity" and another thing for everyday listeners to do so. Listeners did not necessarily consider sound-reproduction technologies simply to mediate between a sound and its representation. *Mediation, schizophonia, the separation of sound and source*—these were neither foregone nor necessary descriptions of the process of sound reproduction. But they were commercially useful ways of thinking about reproducibility, and they had to be elaborately demonstrated for listeners. Early public performances of telephones and phonographs emphasized their novelty—the magic was in their working at all. Later performances, however, had a different task. As with Tainter's graphophone cylinder suspended in midair and his identification of "exterior noise," later performances sought to erase the medium (ironically, by highlighting the technology), to render it transparent, and to turn the question of reproduction into an issue of equivalence between original and copy.

The Edison Phonograph Company's "tone tests" offer an excellent opportunity to consider this matter because they contrast so clearly with earlier public performances of sound-reproduction technologies. While the earlier demonstrations simply had to convince audiences that the machines worked *at all*, the tone tests expressly sought to establish for their audiences an equivalency between live performance and a sound recording. Moreover, the tone tests presumed and made use of the series of prior conditions discussed thus far in this chapter: (1) the studio and the network as foundations for the efficacy of any sound reproduction; (2) the existence of

able to hear music that they otherwise would not have. Once an audience became familiar with music through a recording rather than through live performance, it was possible to conceive of different relations between performance and recording. As a Victor ad would put it, there was "no need to wait for hours in the rain" to hear an opera or a concert.[78] The tone tests, and, later, ads that privileged recording as an alternative to live performance, could be read as one of the first series of performances guided by recordings—especially since, as noted above, the Edison Company would hire only performers who could "play like the recording." By 1915, the recording industry had made celebrities out of otherwise unknown performers and helped the careers of others, like Enrico Caruso. But the tone tests embodied the relation between live performance and recording that the company hoped to demonstrate to audiences: tone tests were organized, in much the same way as record labels organize rock and pop groups' concert tours today—to promote new recordings—while existing recordings helped promote live performances (or helped promote the sale of phonographs).

The tone tests were not the first time that the Edison Company advertised recording as the equivalent of live performance. A particularly well-titled Edison ad, "The Acme of Realism"—depicting a child destroying a phonograph—carries the subtitle "looking for the band."[80] The ad clearly emphasizes that there was no experiential difference between hearing a live performance and hearing a recording. In a particularly effective ideological inversion, it suggests that, rather than learning that recorded and live music were "the same thing," children had to be taught the *difference* between live and recorded sound. Some phonograph owners clearly identified with this rhetoric and sought to impress its "obviousness" on others: "He said it was pretty good for an imitation. 'Imitation!' said I, 'why, Mr. T., that was no imitation; that was the genuine article—the Phonograph *never* imitates, it reproduces the actual music as played by the performer,' but I could see by his manner that he did not accept the statement; even though it was backed up by his wife. We had a good laugh about my friend's mistake afterward."[81] The writer finds his friend laughable because of the faith that he has already invested in the machine. The writer's emphatic assertion of obviousness is in this case itself ideological: *of course* the machine is capable of authentic reproduction because the writer has already framed it in the tropics of authenticity.[82] Obviousness is central to the whole artifice: to admit that it is *not* obvious to any listener that sound reproduction "reproduces the actual" calls the authenticity of the whole enterprise into



Dr. Jekyll *and* Mr. Hyde At the Telephone

Courteous and considerate co-operation is as essential at the telephone as in the office or home.

In every use of the telephone system, three human factors are brought into action—one at each end, one or both anxious and probably impatient, another at the central office, an expert, at least as intelligent and reliable as the best stenographers or bookkeepers.

For the time being, this central office factor is the personal servant of the other two and is entitled to the same consideration that is naturally given to their regular employees.

Perfect service depends upon the perfect co-ordinate action of all three factors—any one failing, the service suffers. This should never be forgotten.

All attempts to entirely eliminate the personal factor at the central office, to make it a machine, have been unsuccessful. There are times when no mechanism, however ingenious, can take the place of human intelligence.

The marvelous growth of the Bell System has made the use of the telephone universal and the misuse a matter of public concern. Discourtesy on the part of telephone users is only possible when they fail to realize the efficiency of the service. It will cease when they talk over the telephone as they would talk face to face.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY
AND ASSOCIATED COMPANIES

One Policy. One System. Universal Service.

43

question. It would suggest that the apprehension of mediation is not immediately understood—it is learned.

In a fashion similar to the Edison Company's campaign for the fidelity of its machines, and around the same time, Bell Telephone also sought to convince users that telephone conversation was the same thing as face-to-face conversation. Its ads suggest that people had to be convinced that telephony was simply a mediation of a face-to-face interaction. In response to operators' complaints and the company's own concerns about misbehavior on the telephone, Bell Telephone hired an agency to produce advertisements urging telephone users to ignore the difference between telephone and face-to-face interaction. Entitled "Dr. Jekyll and Mr. Hyde at the Telephone" (figure 43), one ad emphasized the need for courtesy because the

Figure 43. "Dr. Jekyll and Mr. Hyde at the Telephone"—AT&T advertisement (courtesy Archives Center, National Museum of American History)

gramophone, required other strategies if consistent results during operation were to be obtained. Sales tags from an 1894 gramophone advise the potential user not to "get discouraged if the machine doesn't give entire satisfaction *at once*. It will take a *little* practice to turn the machine according to the directions coming with each machine."[88] First performance took practice; then listening took practice—now the process of reproduction itself takes practice. The directions themselves were elaborate and designed for people who had never heard reproduced sound before. In their specificity, they make clear some of the central elements of reproducibility such as constant speed that we now take for granted:

> The American Hand Gramophone reproducer is a talking machine which is both simple and effective, and will not easily get out of order, provided that the following directions are carefully kept in mind: 1. Place the machine before you, as shown in the picture [the cover pictures Berliner's daughter sitting in front of a gramophone], resting the arm fully upon the table, and turn the hand-wheel with a *level* movement at the rate of about 150 times a minute. To acquire this regularity of motion, practice it a number of times with the level and sound-box lifted off from the turn-table.
>
> *Hold the handle loosely, so that that it slides readily through the fingers.* 2. The standard velocity of the center turn-table for 7-inch plates is about 70 *revolutions a minute.* The more rapid motion will raise the pitch and sharpen the sound; a slower motion will deepen the same. *First get the speed and then place the reproducer and needle into the outer groove or the next one.*[89]

Of course, users could not possibly count seventy revolutions a minute; their best guess as to the proper pitch for playback was as close as they would get. Later gramophones would add a governor.[90] The manual that provided these instructions took nothing for granted: every nuance of tone and volume was spelled out in great detail. An adjusting spring that could be tightened or loosened allowed for variation in volume and clarity (the tone became less and less clear as the volume grew louder). The frequent replacement of needles was recommended, on the grounds that a duller needle would produce a louder, less-articulate sound and would eventually wear down the record. Instructions for use included a quick lesson in acoustics: pointing the machine toward the wall would deepen the bass response; large wall hangings would dampen the sound. Finally, this particular manual emphasized that preferences in tone were individual—some people would prefer hearing tubes and others the horn.

In spelling it all out for the user who had never heard a reproduced sound before, this gramophone manual tells us a lot about the difference between the rhetoric of sound fidelity and the practice of reproducing sound. The manual painstakingly takes the novice user through all the possible variables in the machine's tonality: the needle; the rotation speed; the placement of the machine in the room; the type of horn or ear tube used; clarity; and even personal preference. While the advertising language of fidelity suggests that "perfect fidelity" occurs when the machine mysteriously effects the sound and no longer affects it, this manual for use offers us something closer to a sonic nominalism. Our gramophonic novice was being taught that the sound of sound is entirely situated, depending on physical space, timing, personal preference, and the idiosyncrasies of any given sound event.

Inspectors' manuals for phonographs offer a sort of inverted account of the gramophone manual. Edison inspectors were advised as to the character of improper sonic performance—"scratchy reproduction; poor recording and reproducing; sounds too weak, or failure to articulate properly"—and each sound was indicative of a mechanical malfunction. The inspector's manual reads like Laennec's *Treatise on Mediate Auscultation*, this time abridged and for machines. Not only were the sounds of the apparatus cataloged; they were medicalized like the sounds of the body. The goal was to eliminate the tones of the machine except for those deemed preferable and, therefore, labeled *transparent* (or, more likely, *easier to ignore*).[91] A working phonograph for the Edison Company was like Hegel's "vanishing mediator": it organized sonic relations and faded away into nothingness.

Despite this desire for transparency, the ideas of "preferred tone" and consumer choice were useful selling points for phonographs and, later, for radio parts. In a 1913 advertisement, Victor claimed that its "system of changeable needles gives you complete musical control." The copy masterfully blended this idea of consumer choice with the transparent aesthetic of pure fidelity: "A changeable needle is the only system that positively guarantees a perfect point for playing every record; a changeable needle adapts the different selections to the requirements of different rooms, and to meet the tastes of different people; a changeable needle enables *you* to hear every record just as *you* want to hear it. . . . Always use Victor Machines with Victor Records and Victor Needles—*the combination*. There is no other way to get the unequaled Victor tone."[92] "A perfect point for playing every record": if fidelity had been a gold standard for sound reproduction, Victor's

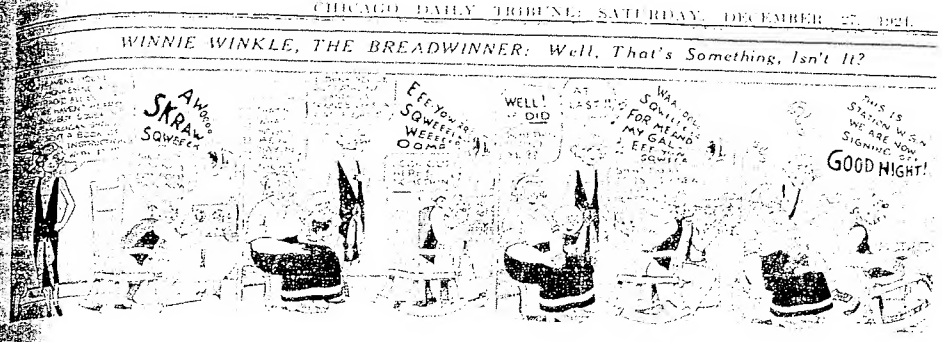
vertising] would make fun of poor connections and the difficulty of hearing over the wires."

Sound-recording technologies received their share of printed criticism as well. A 1926 story written from a child's point of view lambasted phonograph music as "an awful mechanical orgy. . . . I screamed and howled with rage, shame and terror. I tried to wrap the bear-skin rug around me as protection."[98] Victor's advertising campaign for the Orthophonic Victrola was parodied:

> You hear the deep boiler-factory cacophony of the bass, the shrill shrieking of the trebles. Every instrument sounds like a skeletons Charleston on a tin roof. Orthopunic reproduction will make you a firm believer in birth control.
>
> The new Orthophunic Sierrola brings the elite of the nation's boiler factories to your home. It makes even a classical symphony sound like jazz—if you don't like jazz.[99]

The parody works because all the essential components are there in reverse: instead of treble and bass being good, they are harsh; the machine sounds terrible; and it adds its own sonic character to everything it touches. In essence, the joke tells the truth that nobody wanted to hear but everybody knew—sound reproduction shaped the sounds that went through the network. It could not be otherwise.

Radio listening suffered similar criticism in cartoons and articles. The noise that advertisers claimed to be able to prevent was a common characteristic of amateur radio listening. One cartoon carried the caption "A piercing shriek rang through the mansion as Madeline discovered to her horror that her husband, with whom she had just been united in wedlock has an appetite for the radio," the frame juxtaposing the unhappy bride, in the background, watching from behind a drawn curtain, and a groom, happily listening to a cacophonic radio loudspeaker.[100] Writers coined the term *listeneritis* or *radioitis* for the phenomenon of the radio operator hearing something in the static where there was nothing at all: "Broadcasting of the radioitis static fantasie should be given a place among the horrors."[101] Cartoons made fun of listeners tolerating the radio's noise in search of that tiny snippet of programming or the popular myth that radio transmitters were so sensitive that they could pick up "a fly's footsteps." These are all images of audile technique wildly out of control—too fine a sense of foreground and background led listeners to discern sonic indices of nonexistent distant events (figure 45).



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Listening for fidelity was structured by the desire to hear something through the network and the fear that the network would not work. Another kind of pitfall of radio listening was misraking local sounds for distant ones. One writer confessed to thinking that he had heard a distant wireless conversation when in fact he had grounded his radio to the same wire as that used for the household telephone—which was a party line. Similarly, 1923 cartoon made fun of a woman who heard people singing hymns through her headphones: "Oh Ted, I bet I got HEAVEN!" "Baby you're a nut—it's that church revival meeting next door!" replied her male companion as he opened the window.[102] The cartoon's lesson is that one must refine her audile technique lest she find a false salvation in the technology.

If this last anecdote suggests that the technology was shot through with gender relations, the hopes and dreams for sound recording and radio show their connection to other kinds of gendered and sexualized longings. These technologies were understood as having the potential to break through social boundaries and at the same time to help enforce social norms. The idea of audiosurveillance was captivating to early users. One dealer wrote of a woman customer who wanted to "catch her husband at it"; he replied that the phonograph would not catch sounds through a keyhole.[103] Yet the industry press seemed at least as interested in the possibilities as in the facts. Carolyn Marvin has collected a whole range of anecdotes: operators listening in on conversations; men having affairs with women operators; cases of mistaken identity; and marriage by telephone and phonograph.[104]

Figure 45. "Winnie Winkle, Breadwinner"—1924 cartoon (courtesy Archives Center, National Museum of American History)

as a "new" and "better" sound when they first heard it, but this has more to do with aesthetic preferences and tonal distinctions *among* sound-reproduction technologies than with the fidelity of a copy to an original. The difference between Edison's tone test ads and the Orthophonic ads was that the latter could presume a comparability between live and recorded music—their goal was to show that the Orthophonic was closer to the gold standard of true fidelity.

As a machine, the Orthophonic was the result of considerable technical innovation, innovation started by Western Electric and completed by Victor, Columbia, and other phonograph manufacturers. During the mid-1920s, the sound-recording industry faced a significant challenge from radio. By all accounts, audiences preferred the sound of radio—which used vacuum tubes and electricity to receive, transmit, and reproduce sound across space. Electric recording grafted radio's electric reproduction technology onto sound recording's hitherto acoustic mechanism; it allowed for a wider frequency spectrum to be heard and also for a greater degree of amplification than in acoustic recording. The Orthophonic was one of the first machines to use electricity to play back recordings. It was also one of the first to play back recordings made with equipment modeled after radio's—using vacuum tubes and electricity in the recording process as well as the reproduction process. Electric recordings had more treble and bass and could be played at a considerably higher volume.

Listeners were starting to notice the difference, and the introduction of electric recording was in part an attempt to co-opt some of the enthusiasm for "the radio sound."[113] Orthophonics combined this electric recording process, first, with a folded horn speaker and, later, with an electric speaker. Both represented radical departures from previous horn construction. The folded horn allowed for a much "longer" horn in a smaller space, thereby improving frequency response and power—essentially emphasizing the tonal characteristics of electric recording. The electric-magnetic voice coil speakers that replaced folded horns allowed for even greater amplification and tonal range. These technical changes are usually cited as the reason for a preference for the Orthophonic and electric recording in general over mechanical recording—what historians have called *acoustic* recording.

These historical shifts in the definition of what constitutes high fidelity were not, however, unidirectional. It was not a matter of each new machine simply setting a higher standard. The standards themselves were contested. For all the many mechanical differences that could be listed, we

cannot automatically assume that wider frequency response is a necessarily desirable characteristic of sound reproduction. In other words, listeners do not always or automatically understand improved technical specifications as resulting in "better" sound. Examples abound of people preferring older sound-reproduction technologies to newer ones (presumably more technically perfect than their predecessors). As I write, many self-appointed heirs to the McLuhanite throne offer that we are undergoing a digital revolution. Yet there is a booming market in used and vacuum-tube equipment among musicians, sound engineers, and studios; other companies are reintroducing old vacuum-tube designs for audio gear and developing "tube-emulation" software for digital audio. Nobody disputes the clarity of digital reproduction, but, to many ears, the old vacuum-tube equipment sounds better, and the result has been an explosion in the vintage and used market. Similarly, audio recording engineers routinely select microphones with an incomplete and uneven frequency response in order to record a more appealing sound. John Mowitt makes a similar point about noise reduction and the move toward "silent" digital recording: "The fetish of noise reduction has gone hand in hand with the aggressive marketing of distortion boosters and other less obvious instrumental sources of noise." Similarly, Peter Manuel argues that some Indian audiences have become accustomed to the sound of cheaply reproduced tapes and, therefore, have come to prefer that sound in their recorded music.[115]

The same can be said of the moment marked by the Orthophonic's introduction. Two noted phonograph historians, Oliver Read and Walter Welch, wax nostalgic (pardon the pun) for mechanical recording because they believe that mechanical recording was more representative of its source. In mechanical recordings, sounds vibrate a stylus, which in turn indents or engraves a surface, recording those vibrations, which can then be reproduced by reversing the process. Electric recording and reproduction add a stage by transforming sound into electricity. Read and Welch reason that mechanical recording is more properly "acoustic" (and faithful to the original) because it has one less stage of transformation. But both processes involve turning sound into something else in order to reproduce it. One may have a preference for the sound of one process or the other, but, in either case, the recording is not truly acoustic—since it transforms sound into something else—and it does not retain the original in its initial form. Contemplating whether one is "closer" to the original than the other after such a transformation has taken place is a purely semantic exercise.[116]

"the side of a man's face." For the louder gramophone, one could presumably sit back and listen with both ears. The *New York Times* ran a similar article a decade later, praising a St. Petersburg (Russia) prefect who banned the use of gramophones, first, near open doors or windows and, eventually, in the whole central city. In praising the prefect's efforts to save the population "from the torture of its metal voice," the anonymous *Times* writer concluded that "martial law has its advantages."[123] The *Times* neglected to report a similar event in the United States ten years earlier when a New Orleans judge ruled that phonograph and graphophone users (gramophones were not widely available, if at all, in 1899 New Orleans) could be fined for disturbing the peace if neighbors complained.

The *Phonoscope* and the *Times* did not represent unanimous views on the question of volume: they were nearly contradicted by another phonograph magazine equally concerned with middle-class decorum but considerably more willing to consider the potential of a machine that could "blow off the side of a man's face." The *Phonogram* ran what was for it a lengthy feature on a phonograph built in England that could be heard ten miles away: "You can whisper a sentence into the machine's little funnel-shaped mouthpiece and it will repeat it in tones that are more deafening than the shrieks of a liner's steam siren."[124] No doubt, the piece was more fantasy than reality, but the desire for amplification is clear. A month later, the same magazine ran a piece entitled "An Instrument of Satan," decrying the excessive volume of the gramophone, and a short letter from a Bishop, Illinois, man who was "very well pleased" with his machine, "especially on account of loudness."[125] Clearly, what constitutes "good," "better," and "faithful" reproduction in actual social practice, especially in the early history of sound reproduction, was based on highly variable judgments. The job of advertisers and manual writers was to train listeners.

One of the most common moves in twentieth-century American advertising is to "educate" readers in order to persuade them that the product being hawked is superior. This has been widely noted in ads for soap and other hygiene products.[126] The same kind of logic was at work in advertisements for reproduction equipment — teaching readers to *listen* for fidelity (or at least a particular dimension of sound called *fidelity*) was the expressed goal. This set of operations is rendered abundantly clear in a sixty-page pamphlet put out by Federal-Brandes in 1927. It combined a discussion of audile technique and sound fidelity with an extended advertisement for Kolster radios and a lengthy discussion of the aesthetics of concert music. In short, this "manual" explained how to listen and what to listen for in both the music and the medium. Perhaps it can be read as a kind of audile hygienics.

The pamphlet opens with the "novel sense" assertion so common to scholars as well as advertisers: "Modern life has educated the eye far more than the ear. We receive much of literature and the [*sic*] drama by way of the motion pictures [still silent at this point]. Magazines and newspaper have become largely pictorial. 'Visual Education' is common in our schools; but the human ear still remains comparatively neglected." The implication is that the ear *needs* aesthetic training — a need that Kolster intends to fulfill. With this justification in place, Sigmund Spaeth — a music educator who had previously published this essay elsewhere — highlights listening as an aesthetic skill to be cultivated through careful attention and practice: "Many people who think they are listening to music are really not listening at all."[127] Spaeth's reasoning moves carefully and quickly: beginning with a comparison of music to the everyday sounds of the city, suburb, or country, he argues that, if a person can distinguish the sounds of his or her environment, it is equally possible to distinguish the sounds of an orchestra and learn the differences among the instruments. Audile technique is now within the reach of everyone. On this basis, Spaeth introduces the concept of timbre ("tonal color") and spends the rest of the pamphlet discussing how to discern among the timbres of voices and instruments.

Throughout, as a part of the advertisement, the publishers have inserted footnotes in the form of prominently placed pull-quotes. Taken together, these footnotes point clearly to the object of Spaeth's lessons in audile technique — the sound of the radio itself. Consider this selection:

1. How many of the Announcers can you identify over your set before they tell you who they are? Kolster Radio owners get the complete identifying timbre of the voice with every vowel and consonant.
2. Make these listening experiments on your Kolster set and you will be surprised at the skill and power to differentiate which your sense of hearing develops.
6. Have your radio checked against a Kolster set for fidelity of reception. Most people are amazed at the difference. Any Kolster dealer will do this for you.
7. This personal element is the individuality whose rich presence prevents ear-fatigue and boredom. These last come from "untrue" sounds which are the reasons why an inferior radio tires you in a short time.

what sound reproduction was supposed to do; it was the fantastic desire behind sound-reproduction technologies. But, like other fragile commodities, sounds had to be packaged for transport. The social process of reproduction transformed the practice of sound production.

In essence, the discourse of fidelity takes sound reproduction out of the social world and places it in the world of magic. This is very useful if one's goal is to make a new sound technology appealing to listeners. At a theoretical level, this is a useful move for privileging face-to-face speech and live musical performance because it explains sound reproduction through a theory of mediation: through reproduction, a hitherto "unmediated" phenomenon (the original, in all its presence and fullness) becomes mediated. The implicit goal of the mediation is to reproduce the fullness of presence found in the original. Not surprisingly, sound reproduction usually fails on this score.[129] Reasoning based on constructs of mediation or correspondence theories of representation—reasoning that takes for granted a certain kind of original/copy relation—not only results in positing an inevitable loss of being in moving from original to copy, but also, ironically, posits mediation only in the hope that it will later vanish, yielding a perfect or transparent copy. The failed hopes for mediation then stand in as the promise of interpersonal presence.

Sound fidelity has traditionally been conceptualized as the faithfulness of machines, their products, and their users to a reality that exists prior to and outside reproduction. Copies were understood as debased versions of originals, as sonic events that had experienced a loss of being. Yet, as I have shown, the reproduction of sound invariably involves a specialized process of sound production. The logical conclusion of this reasoning should be clear by now, as it was to audiences listening to early demonstrations of telephones and phonographs: "face-to-face" or "live" sound events are a social practice fundamentally different from technological sound reproduction and its attendant forms of sound production. It was not possible to sample the acoustic world, to audit an event, without participating in it. This is not to say that the two spheres of practice have nothing in common or even that people may experience them as two versions of the same thing—they are, of course, deeply connected today. Not only do various forms of face-to-face communication reference (and get referenced by) sound reproduction, but they also often coexist in the same room, in events as simple as a conversation between two people watching—and hearing—their television. (In fact, with the increasing use of sampling devices and computers in live musical performance, their connections are deeper than

ever.) But the imagined correspondence between live and reproduced had to be invented along with the sound media. Listeners had to be convinced of this equivalence. Since true fidelity could never be achieved (since a copy would under all circumstances suffer some loss of being from the original, however small), a set of procedures and aesthetics had to be developed to stand in for reality within the system of reproduced sounds. Through the conventions of realism and the rhetoric of fidelity, listeners could collapse the difference between live and reproduced into a single continuum of likeness and difference. Sound fidelity became an ever-shifting standard for the functioning of sound-reproduction technologies, a means by which to measure the distance between original and copy; it was an impossible vantage point from which to assess the fidelity of the machines to a fictitious external reality.

The discourse of fidelity is very much alive in commercial contexts as well as in some cultural theory (as I discussed at the beginning of the chapter). The idea that the mediation of sound inhered in the technology to reproduce it could be read as a "modernization" thesis: reproduction technology modernizes sound, rupturing a prior and ancient fullness and self-presence in the sonic world. Such a formulation demands a price from the present in order to pay the past: the loss of being, the disappearance of aura. The mediation thesis requires us to believe its opposite, not once, but twice. First, it posits the moment of unmediated sonic reality prior to sound's technological mediation. Then, it posits the ideal form of mediation as a vanishing mediator—where the medium produces a perfect symmetry between copy and original and, thereby, erases itself.[130] I have said throughout this chapter that the construct of reproduction as mediation takes sound reproduction out of its social milieu. But this sort of thinking does suggest a larger perspective on social reality: a privileging of the small, the interpersonal, and the face-to-face alongside a coincident hostility to large-scale forms of social organization. In this way, the discourse of sound fidelity is not significantly different from other philosophical accounts of communication that privilege some version of physical and/or metaphysical presence in binary contrast with absence.

The conceptual split between original and copy was itself an ideological project, a resolution to a cultural problem. Faith propelled the history of the machines, even as it denied their historicity. The promise of better fidelity has always been a Hegelian promise of synthesis and supersession—that *this* incarnation of reproducibility will finally capture the essence of some prior unreproduced reality. The perfect mediator would